

The intcalc package

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Abstract

This package provides expandable arithmetic operations with integers.

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1 Documentation

1.1 Introduction

Package `intcalc` defines arithmetic operations that deal with integers. Integers mean numbers in $\text{T}_{\text{E}}\text{X}$. The same restrictions apply, the range is limited to `[-2147483647, 2147483647]`.

The operations have the form of macros that take one or two integers as parameter and return the integer result. The macro name is a three letter operation name prefixed by the package name, e.g. `\intcalcAdd1043` returns 53.

The macros are fully expandable, exactly two expansion steps generate the result. Therefore the operations may be used nearly everywhere in $\text{T}_{\text{E}}\text{X}$, even inside `\number`, `\csname`, file names, or other expandable contexts.

The package contains two implementations of the operations. If $\varepsilon\text{-T}_{\text{E}}\text{X}$ is detected then the macros are implemented using its features (`\numexpr`). Otherwise the slower implementation without $\varepsilon\text{-T}_{\text{E}}\text{X}$'s help is choosen.

1.2 Conditions

1.2.1 Preconditions

- Arguments can be anything that $\text{T}_{\text{E}}\text{X}$ interprets as “number”. Examples: plain numbers, count or length register, macros that expands to a number.
- The arguments are limited to the range `-2147483647` until `2147483647`. These numbers belong to the range. Note that some operations have additional restrictions to the range.
- The argument may be expressions that `\numexpr` understands if $\varepsilon\text{-T}_{\text{E}}\text{X}$ is available.
- The resulting number must fit in the allowed range.

1.2.2 Postconditions

Additional properties of the macros apart from calculating a correct result (of course ☺):

- The macros are fully expandable. Thus they can be used inside `\edef`, `\csname`, after `\number`, for example.
- Furthermore exactly two expansion steps calculate the result.

- The number consists of one optional minus sign and one to ten digits. The first digit is larger than zero for numbers that consists of more than one digit.

In short, the number format is exactly the same as `\number` generates. And the tokens (minus sign, digits) have catcode 12 (other).

- Call by value is simulated. First the arguments are converted to numbers. Then these numbers are used in the calculations.

Remember that arguments may contain expensive macros or ε -TeX expressions. This strategy avoids multiple evaluations of such arguments.

1.3 Error handling

There are two kinds of errors if a precondition is violated: Some errors are detected by the macros, example: division by zero. In this cases an undefined control sequence is called and causes a TeX error message, example: `\IntCalcError:DivisionByZero`. The name of the control sequence contains the reason for the error. The TeX error may be ignored. Then the operation returns zero as result. Because the macros are supposed to work in expandible contexts. An traditional error message, however, is not expandable and would break these contexts.

If a number exceeds the range of -2147483647 until 2147483647, then TeX throws an error “Number too big” and recovers by using biggest allowed value. Example for the negative number -3000000000 is replaced by -2147483647.

1.4 Operations

Some definition equations below use the function `Int` that converts a real number to an integer. The number is truncated that means rounding to zero:

$$\text{Int}(x) := \begin{cases} \lfloor x \rfloor & \text{if } x \geq 0 \\ \lceil x \rceil & \text{otherwise} \end{cases}$$

1.4.1 Inv, Abs, Sgn

`\intcalcInv {⟨x⟩}`

Macro `\intcalcInv` switches the sign.

$$\text{Inv}(x) := -x$$

`\intcalcAbs {⟨x⟩}`

Macro `\intcalcAbs` returns the absolute value of integer $\langle x \rangle$.

$$\text{Abs}(x) := |x|$$

`\intcalcSgn {⟨x⟩}`

Macro `\intcalcSgn` encodes the sign of $\langle x \rangle$ as number.

$$\text{Sgn}(x) := \begin{cases} -1 & \text{if } x < 0 \\ 0 & \text{if } x = 0 \\ 1 & \text{if } x > 0 \end{cases}$$

These return values can easily be distinguished by `\ifcase`:

```

\ifcase\intcalcSgn{<x>}
  $x=0$
\or
  $x>0$
\else
  $x<0$
\fi

```

1.4.2 Min, Max, Cmp

`\intcalcMin {⟨x⟩} {⟨y⟩}`

Macro `\intcalcMin` returns the smaller of the two integers.

$$\text{Min}(x, y) := \begin{cases} x & \text{if } x < y \\ y & \text{otherwise} \end{cases}$$

`\intcalcMax {⟨x⟩} {⟨y⟩}`

Macro `\intcalcMax` returns the larger of the two integers.

$$\text{Max}(x, y) := \begin{cases} x & \text{if } x > y \\ y & \text{otherwise} \end{cases}$$

`\intcalcCmp {⟨x⟩} {⟨y⟩}`

Macro `\intcalcCmp` encodes the comparison result as number:

$$\text{Cmp}(x, y) := \begin{cases} -1 & \text{if } x < y \\ 0 & \text{if } x = y \\ 1 & \text{if } x > y \end{cases}$$

These values can be distinguished by `\ifcase`:

```

\ifcase\intcalcCmp{<x>}{<y>}
  $x=y$
\or
  $x>y$
\else
  $x<y$
\fi

```

1.4.3 Inc, Dec, Add, Sub

`\intcalcInc {⟨x⟩}`

Macro `\intcalcInc` increments $\langle x \rangle$ by one.

$$\text{Inc}(x) := x + 1$$

`\intcalcDec {⟨x⟩}`

Macro `\intcalcDec` decrements $\langle x \rangle$ by one.

$$\text{Dec}(x) := x - 1$$

`\intcalcAdd {⟨x⟩} {⟨y⟩}`

Macro `\intcalcAdd` adds the two numbers.

$$\text{Add}(x, y) := x + y$$

`\intcalcSub {⟨x⟩} {⟨y⟩}`

Macro `\intcalcSub` calculates the difference.

$$\text{Sub}(x, y) := x - y$$

1.4.4 Shl, Shr

`\intcalcShl {⟨x⟩}`

Macro `\intcalcShl` implements shifting to the left that means the number is multiplied by two. Overflow is possible. Negative values are not permitted.

$$\text{Shl}(x) := x * 2 \quad \text{for } x \geq 0$$

`\intcalcShr {⟨x⟩}`

Macro `\intcalcShr` implements shifting to the right. That is equivalent to an integer division by two. Negative values are not permitted.

$$\text{Shr}(x) := \text{Int}(x/2) \quad \text{for } x \geq 0$$

1.4.5 Mul, Sqr, Fac, Pow

`\intcalcMul {⟨x⟩} {⟨y⟩}`

Macro `\intcalcMul` calculates the product of $\langle x \rangle$ and $\langle y \rangle$.

$$\text{Mul}(x, y) := x * y$$

`\intcalcSqr {⟨x⟩}`

Macro `\intcalcSqr` returns the square product.

$$\text{Sqr}(x) := x^2$$

`\intcalcFac {⟨x⟩}`

Macro `\intcalcFac` returns the factorial of $\langle x \rangle$. Negative numbers are not permitted.

$$\text{Fac}(x) := x! \quad \text{for } x \geq 0$$

$$(0! = 1)$$

`\intcalcPow Mx My`

Macro `\intcalcPow` calculates the value of $\langle x \rangle$ to the power of $\langle y \rangle$. The error “division by zero” is thrown if $\langle x \rangle$ is zero and $\langle y \rangle$ is negative. permitted:

$$\text{Pow}(x, y) := \text{Int}(x^y) \quad \text{for } x \neq 0 \text{ or } y \geq 0$$

$$(0^0 = 1)$$

1.4.6 Div, Mul

`\intcalcDiv {\langle x \rangle} {\langle y \rangle}`

Macro `\intcalcDiv` performs an integer division. Argument $\langle y \rangle$ must not be zero.

$$\text{Div}(x, y) := \text{Int}(x/y) \quad \text{for } y \neq 0$$

`\intcalcMod {\langle x \rangle} {\langle y \rangle}`

Macro `\intcalcMod` gets the remainder of the integer division. The sign follows the divisor $\langle y \rangle$. Argument $\langle y \rangle$ must not be zero.

$$\text{Mod}(x, y) := x \% y \quad \text{for } y \neq 0$$

The result ranges:

$$-|y| < \text{Mod}(x, y) \leq 0 \quad \text{for } y < 0$$

$$0 \leq \text{Mod}(x, y) < y \quad \text{for } y \geq 0$$

2 Implementation

1 `*package`

2.1 Reload check and package identification

Reload check, especially if the package is not used with L^AT_EX.

```

2 \begingroup
3 \catcode44 12 % ,
4 \catcode45 12 % -
5 \catcode46 12 % .
6 \catcode58 12 % :
7 \catcode64 11 % @
8 \expandafter\let\expandafter\x\csname ver@intcalc.sty\endcsname
9 \ifcase 0%
10 \ifx\x\relax % plain
11 \else
12 \ifx\x\empty % LaTeX
13 \else
14 1%
15 \fi
16 \fi
17 \else
18 \expandafter\ifx\csname PackageInfo\endcsname\relax
19 \def\x#1#2{%
20 \immediate\write-1{Package #1 Info: #2.}%
21 }%
22 \else
23 \def\x#1#2{\PackageInfo{#1}{#2, stopped}}%
24 \fi
25 \x{intcalc}{The package is already loaded}%

```

```

26 \endgroup
27 \expandafter\endinput
28 \fi
29 \endgroup

```

Package identification:

```

30 \begingroup
31 \catcode40 12 % (
32 \catcode41 12 % )
33 \catcode44 12 % ,
34 \catcode45 12 % -
35 \catcode46 12 % .
36 \catcode47 12 % /
37 \catcode58 12 % :
38 \catcode64 11 % @
39 \expandafter\ifx\csname ProvidesPackage\endcsname\relax
40 \def\x#1#2#3[#4]{\endgroup
41 \immediate\write-1{Package: #3 #4}%
42 \xdef#1{#4}%
43 }%
44 \else
45 \def\x#1#2[#3]{\endgroup
46 #2[{#3}]}%
47 \ifx#1\relax
48 \xdef#1{#3}%
49 \fi
50 }%
51 \fi
52 \expandafter\x\csname ver@intcalc.sty\endcsname
53 \ProvidesPackage{intcalc}%
54 [2007/09/09 v1.0 Expandable integer calculations (H0)]

```

2.2 Catcodes

```

55 \expandafter\edef\csname IntCalc@AtEnd\endcsname{%
56 \catcode64 \the\catcode64\relax
57 }
58 \catcode64 11 % @
59 \def\TMP@EnsureCode#1#2{%
60 \edef\IntCalc@AtEnd{%
61 \IntCalc@AtEnd
62 \catcode#1 \the\catcode#1\relax
63 }%
64 \catcode#1 #2\relax
65 }
66 \TMP@EnsureCode{33}{12}% !
67 \TMP@EnsureCode{40}{12}% (
68 \TMP@EnsureCode{41}{12}% )
69 \TMP@EnsureCode{42}{12}% *
70 \TMP@EnsureCode{43}{12}% +
71 \TMP@EnsureCode{45}{12}% -
72 \TMP@EnsureCode{47}{12}% /
73 \TMP@EnsureCode{58}{11}% : (letter!)
74 \TMP@EnsureCode{60}{12}% <
75 \TMP@EnsureCode{61}{12}% =
76 \TMP@EnsureCode{62}{12}% >
77 \TMP@EnsureCode{63}{14}% ? (comment!)
78 \begingroup\expandafter\expandafter\expandafter\endgroup
79 \expandafter\ifx\csname IntCalc@TestMode\endcsname\relax
80 \else
81 \catcode63=9 % ? (ignore)
82 \fi
83 ? \let\IntCalc@@TestMode\IntCalc@TestMode

```

2.3 Macros independent of ϵ -TeX

`\IntCalc@Space`

```
84 \def\IntCalc@Space{ }
```

2.3.1 Abs, Sgn

`\IntCalc@Abs`

```
85 \def\IntCalc@Abs#1#2!{%
86   \ifx#1-%
87     #2%
88   \else
89     #1#2%
90   \fi
91 }
```

`\IntCalc@Sgn`

```
92 \def\IntCalc@Sgn#1#2!{%
93   \ifx#1-%
94     -1%
95   \else
96     \ifx#10%
97       0%
98     \else
99       1%
100    \fi
101    \fi
102 }
```

2.3.2 Min, Max, Cmp

`\IntCalc@Min`

```
103 \def\IntCalc@Min#1!#2!{%
104   \ifnum#1<#2 %
105     #1%
106   \else
107     #2%
108   \fi
109 }
```

`\IntCalc@Max`

```
110 \def\IntCalc@Max#1!#2!{%
111   \ifnum#1>#2 %
112     #1%
113   \else
114     #2%
115   \fi
116 }
```

`\IntCalc@Cmp`

```
117 \def\IntCalc@Cmp#1!#2!{%
118   \ifnum#1=#2 %
119     0%
120   \else
121     \ifnum#1<#2 %
122       -%
123     \fi
124     1%
125   \fi
126 }
```


2.3.3 Fac

`\IntCalc@Fac` It does not make much sense to calculate the faculty by an general algorithm. The allowed range of arguments is too low because of the limited integer domain.

```

127 \def\IntCalc@Fac#1{%
128   \ifcase#1 1% 0!
129   \or 1% 1!
130   \or 2% 2!
131   \or 6% 3!
132   \or 24% 4!
133   \or 120% 5!
134   \or 720% 6!
135   \or 5040% 7!
136   \or 40320% 8!
137   \or 362880% 9!
138   \or 3628800% 10!
139   \or 39916800% 11!
140   \or 479001600% 12!
141   \else
142     \ifnum#1<\z@
143       0\IntCalcError:FacNegative%
144     \else
145       0\IntCalcError:FacOverflow%
146     \fi
147   \fi
148 }
```

2.4 Implementation based on ε -TeX

Only `\numexpr` is used from ε -TeX.

```

149 \begingroup\expandafter\expandafter\expandafter\endgroup
150 \expandafter\ifx\csname numexpr\endcsname\relax
151 \else
```

2.4.1 Inv, Abs, Sgn

`\intcalcInv`

```

152 \def\intcalcInv#1{%
153   \number-\the\numexpr#1\relax\IntCalc@Space
154 }
```

`\intcalcAbs`

```

155 \def\intcalcAbs#1{%
156   \number\expandafter\IntCalc@Abs\the\numexpr#1! %
157 }
```

`\intcalcSgn`

```

158 \def\intcalcSgn#1{%
159   \number\expandafter\IntCalc@Sgn\the\numexpr#1! %
160 }
```

2.4.2 Min, Max, Cmp

`\intcalcMin`

```

161 \def\intcalcMin#1#2{%
162   \number\expandafter\IntCalc@Min
163   \the\numexpr#1\expandafter!%
164   \the\numexpr#2! %
165 }
```

\intcalcMax

```
166 \def\intcalcMax#1#2{%
167   \number\expandafter\IntCalc@Max
168   \the\numexpr#1\expandafter!%
169   \the\numexpr#2! %
170 }%
```

\intcalcCmp

```
171 \def\intcalcCmp#1#2{%
172   \number\expandafter\IntCalc@Cmp
173   \the\numexpr#1\expandafter!\the\numexpr#2! %
174 }%
```

2.4.3 Inc, Dec

\intcalcInc

```
175 \def\intcalcInc#1{%
176   \the\numexpr#1+1\relax
177 }%
```

\intcalcDec

```
178 \def\intcalcDec#1{%
179   \the\numexpr#1-1\relax
180 }%
```

2.4.4 Add, Sub

\intcalcAdd

```
181 \def\intcalcAdd#1#2{%
182   \the\numexpr#1+(#2)\relax
183 }%
```

\intcalcSub

```
184 \def\intcalcSub#1#2{%
185   \the\numexpr#1-(#2)\relax
186 }%
```

2.4.5 Shl, Shr

\intcalcShl

```
187 \def\intcalcShl#1{%
188   \number\expandafter\IntCalc@Shl\the\numexpr#1! %
189 }%
```

\IntCalc@Shl

```
190 \def\IntCalc@Shl#1#2!{%
191   \ifx#1-%
192     0\IntCalcError:ShlNegativeNumber%
193   \else
194     \the\numexpr#1#2*2\relax
195   \fi
196 }%
```

\intcalcShr

```
197 \def\intcalcShr#1{%
198   \number\expandafter\IntCalc@Shr\the\numexpr#1! %
199 }%
```

\IntCalc@Shr

```
200 \def\IntCalc@Shr#1#2!{%
201   \ifx#1-%
202     0\IntCalcError:ShrNegativeNumber%
203   \else
204     \ifodd#1#2 %
205       \the\numexpr(#1#2-1)/2\relax
206     \else
207       \the\numexpr#1#2/2\relax
208     \fi
209   \fi
210 }%
```

2.4.6 Mul, Sqr, Fac

\intcalcMul

```
211 \def\intcalcMul#1#2{%
212   \the\numexpr(#1)*(#2)\relax
213 }%
```

\intcalcSqr

```
214 \def\intcalcSqr#1{%
215   \number\expandafter\IntCalc@Sqr\the\numexpr#1! %
216 }%
```

\IntCalc@Sqr

```
217 \def\IntCalc@Sqr#1!{%
218   \the\numexpr#1*#1\relax
219 }%
```

\intcalcFac

```
220 \def\intcalcFac#1{%
221   \number\expandafter\IntCalc@Fac\the\numexpr#1! %
222 }%
```

2.4.7 Pow

\intcalcPow

```
223 \def\intcalcPow#1#2{%
224   \number\expandafter\IntCalc@Pow
225   \the\numexpr#1\expandafter!%
226   \the\numexpr#2! %
227 }%
```

\IntCalc@Pow

```
228 \def\IntCalc@Pow#1#2!#3#4!{%
229   \ifcase#3#4 % power = 0
230     1%
231   \or % power = 1
232     #1#2%
233   \or % power = 2
234     \the\numexpr#1#2*#1#2\relax
235   \else
236     \ifcase#1#2 % basis = 0, power <> 0
237       0%
238     \ifx#3-% power < 0
239       0\IntCalcError:DivisionByZero%
240     \fi
241   \or
242     1% basis = 1
```

```

243     \else
244     \ifnum#1#2=\m@ne % basis = -1
245     \ifodd#3#4 %
246     -%
247     \fi
248     1%
249     \else % |basis| > 1
250     \ifx#3-% power < 0
251     0%
252     \else % power > 2
253     \IntCalc@PowRec#1#2!#3#4!1!%
254     \fi
255     \fi
256     \fi
257     \fi
258     }%

\IntCalc@PowRec Pow(b, p) {
    PowRec(b, p, 1)
}
PowRec(b, p, r) {
    if p == 1 then
        return r
    else
        ifodd p then
            return PowRec(b*b, (p-1)/2, r*b) % p div 2 = (p-1)/2
        else
            return PowRec(b*b, (p-1)/2, r)
        fi
    fi
}

259 \def\IntCalc@PowRec#1!#2!#3!{%
260     \ifnum#2=\@ne
261     \the\numexpr#1*#3\relax
262     \else
263     \ifodd#2 %
264     \expandafter\IntCalc@PowRec
265     \the\numexpr#1*#1\expandafter!%
266     \the\numexpr(#2-1)/2\expandafter!%
267     \the\numexpr#1*#3\expandafter\expandafter\expandafter!%
268     \else
269     \expandafter\IntCalc@PowRec
270     \the\numexpr#1*#1\expandafter!%
271     \the\numexpr(#2-1)/2\expandafter!%
272     \number#3\expandafter\expandafter\expandafter!%
273     \fi
274     \fi
275     }%

```

2.4.8 Div, Mod

$\mathrm{T}_{\mathrm{E}}\mathrm{X}$'s `\divide` truncates, $\varepsilon\text{-}\mathrm{T}_{\mathrm{E}}\mathrm{X}$'s `\numexpr` rounds the result of a division. The rounding method is called “Symmetric Arithmetic Rounding” or “Round-Half-Up” (“Kaufmännisches Runden” in German):

$$\begin{aligned}
 1 &= 3 \text{ divide } 2 = 1.5 = \text{numexpr } 3/2 = 2 \\
 -1 &= -3 \text{ divide } 2 = -1.5 = \text{numexpr } -3/2 = -2
 \end{aligned}$$

Macro `\intcalcdDiv` follows $\mathrm{T}_{\mathrm{E}}\mathrm{X}$ and truncates. The calculation is done by the following formula:

$$\text{Div}(X, Y) = (X - (Y - 1)/2)/Y \quad \text{for } X, Y > 0 \quad (1)$$

The operator ‘/’ is `\numexpr`'s division.

```

\intcalcDiv
276 \def\intcalcDiv#1#2{%
277 \number\expandafter\IntCalc@Div
278 \the\numexpr#1\expandafter!%
279 \the\numexpr#2! %
280 }%

\IntCalc@Div
281 \def\IntCalc@Div#1!#2!{%
282 \ifcase#2 %
283 0\IntCalcError:DivisionByZero%
284 \else
285 \ifcase#1 %
286 0%
287 \else
288 \expandafter\IntCalc@@Div
289 \romannumeral 0%
290 \ifnum#1<\z@
291 \expandafter-\number-#1%
292 \else
293 \expandafter+\number#1%
294 \fi
295 \expandafter!%
296 \romannumeral 0%
297 \ifnum#2<\z@
298 \expandafter-\number-#2%
299 \else
300 \expandafter+\number#2%
301 \fi
302 !%
303 \fi
304 \fi
305 }%

\IntCalc@@Div
306 \def\IntCalc@@Div#1#2!#3#4!{%
307 #1#3%
308 \the\numexpr(#2-(#4-1)/2)/#4\relax
309 }%

\intcalcMod
310 \def\intcalcMod#1#2{%
311 \number\expandafter\IntCalc@Mod
312 \the\numexpr#1\expandafter!%
313 \the\numexpr#2! %
314 }%

\IntCalc@Mod
315 \def\IntCalc@Mod#1!#2!{%
316 \ifcase#2 %
317 0\IntCalcError:DivisionByZero%
318 \else
319 \ifcase#1 %
320 0%
321 \else
322 \expandafter\IntCalc@@Mod
323 \romannumeral 0%
324 \ifnum#1<\z@
325 \expandafter-\number-#1%
326 \else
327 \expandafter+\number#1%

```

```

328      \fi
329      \expandafter!%
330      \romannumeral 0%
331      \ifnum#2<\z@
332      \expandafter-\number-#2%
333      \else
334      \expandafter+\number#2%
335      \fi
336      !%
337    \fi
338  \fi
339 }%

\IntCalc@@Mod

340 \def\IntCalc@@Mod#1#2!#3#4!{%
341   \if#3+%
342     \if#1+%
343       \the\numexpr#2-\IntCalc@@Div+#2!+#4!##4\relax
344     \else
345       \expandafter\IntCalc@ModX
346       \the\numexpr-#2+\IntCalc@@Div+#2!+#4!##4!#4!%
347     \fi
348   \else
349     -%
350     \if#1+%
351       \expandafter\IntCalc@ModX
352       \the\numexpr-#2+\IntCalc@@Div+#2!+#4!##4!#4!%
353     \else
354       \the\numexpr#2-\IntCalc@@Div+#2!+#4!##4\relax
355     \fi
356   \fi
357 }%

\IntCalc@ModX

358 \def\IntCalc@ModX#1!#2!{%
359   \ifcase#1 %
360     0%
361   \else
362     \the\numexpr#1+#2\relax
363   \fi
364 }%

365 \IntCalc@AtEnd
366 \expandafter\endinput
367 \fi

```

2.5 Implementation without ε -TeX

2.5.1 Inv, Abs, Sgn

```

\intcalcInv

368 \def\intcalcInv#1{%
369   \number\expandafter\IntCalc@Inv\number-#1! %
370 }

\IntCalc@Inv

371 \def\IntCalc@Inv#1!{#1}

\intcalcAbs

372 \def\intcalcAbs#1{%
373   \number\expandafter\IntCalc@Abs\number#1! %
374 }

```

\intcalcSgn

```
375 \def\intcalcSgn#1{%
376   \number\expandafter\IntCalc@Sgn\number#1! %
377 }
```

2.5.2 Min, Max, Cmp

\intcalcMin

```
378 \def\intcalcMin#1#2{%
379   \number\expandafter\IntCalc@Min
380   \number\number#1\expandafter!\number#2! %
381 }
```

\intcalcMax

```
382 \def\intcalcMax#1#2{%
383   \number\expandafter\IntCalc@Max
384   \number\number#1\expandafter!\number#2! %
385 }
```

\intcalcCmp

```
386 \def\intcalcCmp#1#2{%
387   \number\expandafter\IntCalc@Cmp
388   \number\number#1\expandafter!\number#2! %
389 }%
```

2.5.3 Inc, Dec

\intcalcInc

```
390 \def\intcalcInc#1{%
391   \number\expandafter\IntCalc@IncSwitch\number#1! %
392 }
```

\IntCalc@IncSwitch

```
393 \def\IntCalc@IncSwitch#1#2!{%
394   \ifx#1-%
395     -%
396     \csname IntCalc@Empty%
397     \IntCalc@Dec#2!%
398   \else
399     \csname IntCalc@Empty%
400     \IntCalc@Inc#1#2!%
401   \fi
402 }
```

\intcalcDec

```
403 \def\intcalcDec#1{%
404   \number\expandafter\IntCalc@DecSwitch\number#1! %
405 }
```

\IntCalc@DecSwitch

```
406 \def\IntCalc@DecSwitch#1#2!{%
407   \ifx#1-%
408     -%
409     \csname IntCalc@Empty%
410     \expandafter\IntCalc@Inc#2!%
411   \else
412     \ifx#10%
413       -1%
414     \else
415       \csname IntCalc@Empty%
```

```

416      \IntCalc@Dec#1#2!%
417      \fi
418      \fi
419  }

```

\IntCalc@Inc

```

420 \def\IntCalc@Inc#1#2{%
421   \ifx#2!%
422     \csname IntCalc@IncDigit#1\endcsname1%
423   \else
424     \csname IntCalc@IncDigit#1%
425     \expandafter\IntCalc@Inc\expandafter#2%
426   \fi
427 }

```

\IntCalc@IncDigit[0-8]

```

428 \def\IntCalc@Temp#1#2{%
429   \expandafter\def\csname IntCalc@IncDigit#1\endcsname##1{%
430     \endcsname
431     0%
432     \ifcase##1 %
433       #1%
434     \else
435       #2%
436     \fi
437   }%
438 }
439 \IntCalc@Temp 01
440 \IntCalc@Temp 12
441 \IntCalc@Temp 23
442 \IntCalc@Temp 34
443 \IntCalc@Temp 45
444 \IntCalc@Temp 56
445 \IntCalc@Temp 67
446 \IntCalc@Temp 78
447 \IntCalc@Temp 89

```

\IntCalc@IncDigit9

```

448 \expandafter\def\csname IntCalc@IncDigit9\endcsname#1{%
449   \expandafter\endcsname
450   \ifcase#1 %
451     09%
452   \else
453     10%
454   \fi
455 }

```

\IntCalc@Dec

```

456 \def\IntCalc@Dec#1#2{%
457   \ifx#2!%
458     \csname IntCalc@DecDigit#1\endcsname1%
459   \else
460     \csname IntCalc@DecDigit#1%
461     \expandafter\IntCalc@Dec\expandafter#2%
462   \fi
463 }

```

\IntCalc@DecDigit[1-9]

```

464 \def\IntCalc@Temp#1#2{%
465   \expandafter\def\csname IntCalc@DecDigit#1\endcsname##1{%
466     \endcsname

```



```

467      0%
468      \ifcase##1 %
469      #1%
470      \else
471      #2%
472      \fi
473    }%
474  }
475  \IntCalc@Temp 98
476  \IntCalc@Temp 87
477  \IntCalc@Temp 76
478  \IntCalc@Temp 65
479  \IntCalc@Temp 54
480  \IntCalc@Temp 43
481  \IntCalc@Temp 32
482  \IntCalc@Temp 21
483  \IntCalc@Temp 10

```

\IntCalc@DecDigit0

```

484 \expandafter\def\csname IntCalc@DecDigit0\endcsname#1{%
485   \expandafter\endcsname
486   \ifcase#1 %
487   00%
488   \else
489   19%
490   \fi
491 }

```

2.5.4 Add, Sub

\intcalcAdd

```

492 \def\intcalcAdd#1#2{%
493   \number
494   \expandafter\IntCalc@AddSwitch
495   \number\number#1\expandafter!%
496   \number#2!%
497   \IntCalc@Space
498 }

```

\intcalcSub

```

499 \def\intcalcSub#1#2{%
500   \number
501   \expandafter\IntCalc@AddSwitch
502   \number\number#1\expandafter!%
503   \number-\number#2!%
504   \IntCalc@Space
505 }

```

\IntCalc@AddSwitch Decision table for \IntCalc@AddSwitch. By using less than zero operations, the sign of negative numbers can be removed by a simple \IntCalc@Gobble instead of the more expensive \number-.

$x < 0$	$y < 0$	$x < y$	–	$\text{Add}(-x, -y)$
		else		$\text{Add}(-y, -x)$
	else	$-x > y$	–	$\text{Sub}(-x, y)$
		else	+	$\text{Sub}(y, -x)$
else	$y < 0$	$x > -y$	+	$\text{Sub}(x, -y)$
		else	–	$\text{Sub}(-y, x)$
	else	$x > y$	+	$\text{Add}(x, y)$
		else		$\text{Add}(y, x)$

```

506 \def\IntCalc@AddSwitch#1!#2!{%
507   \ifnum#1<\z@
508     \ifnum#2<\z@
509       -%
510       \ifnum#1<#2 %
511         \expandafter\IntCalc@Add\number-#1\expandafter!%
512         \IntCalc@Gobble#2!%
513       \else
514         \expandafter\IntCalc@Add\number-#2\expandafter!%
515         \IntCalc@Gobble#1!%
516       \fi
517     \else
518       \ifnum-#1>#2 %
519         -%
520         \expandafter\IntCalc@Sub\IntCalc@Gobble#1!#2!%
521       \else
522         \expandafter\IntCalc@Sub\number#2\expandafter!%
523         \IntCalc@Gobble#1!%
524       \fi
525     \fi
526   \else
527     \ifnum#2<\z@
528       \ifnum#1>-#2 %
529         \expandafter\IntCalc@Sub\number#1\expandafter!%
530         \IntCalc@Gobble#2!%
531       \else
532         -%
533         \expandafter\IntCalc@Sub\IntCalc@Gobble#2!#1!%
534       \fi
535     \else
536       \ifnum#1>#2 %
537         \IntCalc@Add#1!#2!%
538       \else
539         \IntCalc@Add#2!#1!%
540       \fi
541     \fi
542   \fi
543 }

```

\IntCalc@Add

```

544 \def\IntCalc@Add#1!#2!{%
545   \ifcase#2 %
546     #1%
547   \else
548     \IntCalc@@Add#1!#2!00000000\IntCalc@Space
549   \fi
550 }

```

\IntCalc@Sub

```

551 \def\IntCalc@Sub#1!#2!{%
552   \ifnum#1=#2 %
553     0%
554   \else
555     \IntCalc@@Sub#1!#2!00000000\IntCalc@Space
556   \fi
557 }

```

\IntCalc@@Add

```

558 \def\IntCalc@@Add#1!#2#3!{%
559   \ifx\IntCalc@Empty#3\IntCalc@Empty
560     \@ReturnAfterElseFi{%
561       \IntCalc@@@Add!!#1!#2%

```

```

562     }%
563   \else
564     \@ReturnAfterFi{%
565       \IntCalc@@Add#1!#3!#2%
566     }%
567   \fi
568 }

```

\IntCalc@@Sub

```

569 \def\IntCalc@@Sub#1!#2#3!{%
570   \ifx\IntCalc@Empty#3\IntCalc@Empty
571     \@ReturnAfterElseFi{%
572       \IntCalc@@@Sub!!#1!#2%
573     }%
574   \else
575     \@ReturnAfterFi{%
576       \IntCalc@@Sub#1!#3!#2%
577     }%
578   \fi
579 }

```

\IntCalc@@@Add

```

580 \def\IntCalc@@@Add#1!#2!#3#4!#5{%
581   \ifx\IntCalc@Empty#4\IntCalc@Empty
582     \csname IntCalc@Empty%
583     \@ReturnAfterElseFi{%
584       \IntCalc@ProcessAdd#1#3!#5#2%
585     }%
586   \else
587     \@ReturnAfterFi{%
588       \IntCalc@@@Add#1#3!#5#2!#4!%
589     }%
590   \fi
591 }

```

\IntCalc@@@Sub

```

592 \def\IntCalc@@@Sub#1!#2!#3#4!#5{%
593   \ifx\IntCalc@Empty#4\IntCalc@Empty
594     \csname IntCalc@Gobble%
595     \@ReturnAfterElseFi{%
596       \IntCalc@ProcessSub#1#3!#5#2%
597     }%
598   \else
599     \@ReturnAfterFi{%
600       \IntCalc@@@Sub#1#3!#5#2!#4!%
601     }%
602   \fi
603 }

```

\IntCalc@ProcessAdd

```

604 \def\IntCalc@ProcessAdd#1#2!#3#4{%
605   \ifx\IntCalc@Empty#2\IntCalc@Empty
606     \csname IntCalc@AddDigit#1\endcsname#3%
607     \romannumeral0#4%
608   \else
609     \csname IntCalc@AddDigit#1\csname IntCalc@DigitCarry#3%
610     \@ReturnAfterFi{%
611       \IntCalc@ProcessAdd#2!#4%
612     }%
613   \fi
614 }

```

\IntCalc@ProcessSub

```
615 \def\IntCalc@ProcessSub#1#2!#3#4{%
616   \ifx\IntCalc@Empty#2\IntCalc@Empty
617     \csname IntCalc@SubDigit#1\endcsname#3%
618     \romannumeral0#4%
619   \else
620     \csname IntCalc@SubDigit#1\csname IntCalc@DigitCarry#3%
621     \@ReturnAfterFi{%
622       \IntCalc@ProcessSub#2!#4%
623     }%
624   \fi
625 }
```

\IntCalc@DigitCarry[0-9]

```
626 \def\IntCalc@Temp#1#2{%
627   \expandafter\def\csname IntCalc@DigitCarry#1\endcsname##1{%
628     \ifcase##1 %
629       \endcsname#1%
630     \else
631       \endcsname#2%
632     \fi
633   }%
634 }
635 \IntCalc@Temp 01
636 \IntCalc@Temp 12
637 \IntCalc@Temp 23
638 \IntCalc@Temp 34
639 \IntCalc@Temp 45
640 \IntCalc@Temp 56
641 \IntCalc@Temp 67
642 \IntCalc@Temp 78
643 \IntCalc@Temp 89
644 \IntCalc@Temp 9{{10}}
```

\IntCalc@AddDigit0

```
645 \expandafter\def\csname IntCalc@AddDigit0\endcsname#1{%
646   \ifnum#1>9 %
647     \endcsname10%
648   \else
649     \endcsname0#1%
650   \fi
651 }
```

\IntCalc@AddDigit[1-9]

```
652 \def\IntCalc@Temp#1#2#3{%
653   \expandafter\def\csname IntCalc@AddDigit#1\endcsname##1{%
654     \ifnum##1>#2 %
655       \endcsname 1%
656     \else
657       \endcsname 0%
658     \fi
659     \ifcase##1 #1% 0
660       #3%
661     \else #1% 10
662     \fi
663   }%
664 }
665 \IntCalc@Temp 18{%
666   \or 2% 1
667   \or 3% 2
668   \or 4% 3
669   \or 5% 4
```

```

670 \or 6% 5
671 \or 7% 6
672 \or 8% 7
673 \or 9% 8
674 \or 0% 9
675 }%
676 \IntCalc@Temp 27{%
677 \or 3% 1
678 \or 4% 2
679 \or 5% 3
680 \or 6% 4
681 \or 7% 5
682 \or 8% 6
683 \or 9% 7
684 \or 0% 8
685 \or 1% 9
686 }%
687 \IntCalc@Temp 36{%
688 \or 4% 1
689 \or 5% 2
690 \or 6% 3
691 \or 7% 4
692 \or 8% 5
693 \or 9% 6
694 \or 0% 7
695 \or 1% 8
696 \or 2% 9
697 }%
698 \IntCalc@Temp 45{%
699 \or 5% 1
700 \or 6% 2
701 \or 7% 3
702 \or 8% 4
703 \or 9% 5
704 \or 0% 6
705 \or 1% 7
706 \or 2% 8
707 \or 3% 9
708 }%
709 \IntCalc@Temp 54{%
710 \or 6% 1
711 \or 7% 2
712 \or 8% 3
713 \or 9% 4
714 \or 0% 5
715 \or 1% 6
716 \or 2% 7
717 \or 3% 8
718 \or 4% 9
719 }%
720 \IntCalc@Temp 63{%
721 \or 7% 1
722 \or 8% 2
723 \or 9% 3
724 \or 0% 4
725 \or 1% 5
726 \or 2% 6
727 \or 3% 7
728 \or 4% 8
729 \or 5% 9
730 }%
731 \IntCalc@Temp 72{%

```

```

732 \or 8% 1
733 \or 9% 2
734 \or 0% 3
735 \or 1% 4
736 \or 2% 5
737 \or 3% 6
738 \or 4% 7
739 \or 5% 8
740 \or 6% 9
741 }%
742 \IntCalc@Temp 81{%
743 \or 9% 1
744 \or 0% 2
745 \or 1% 3
746 \or 2% 4
747 \or 3% 5
748 \or 4% 6
749 \or 5% 7
750 \or 6% 8
751 \or 7% 9
752 }%
753 \IntCalc@Temp 90{%
754 \or 0% 1
755 \or 1% 2
756 \or 2% 3
757 \or 3% 4
758 \or 4% 5
759 \or 5% 6
760 \or 6% 7
761 \or 7% 8
762 \or 8% 9
763 }%

```

\IntCalc@SubDigit[0-9]

```

764 \def\IntCalc@Temp#1#2{%
765 \expandafter\def\csname IntCalc@SubDigit#1\endcsname##1{%
766 \ifnum##1>#1 %
767 \endcsname 1%
768 \else
769 \endcsname 0%
770 \fi
771 \ifcase##1 #1% 0
772 #2%
773 \else #1% 10
774 \fi
775 }%
776 }
777 \IntCalc@Temp 0{%
778 \or 9% 1
779 \or 8% 2
780 \or 7% 3
781 \or 6% 4
782 \or 5% 5
783 \or 4% 6
784 \or 3% 7
785 \or 2% 8
786 \or 1% 9
787 }
788 \IntCalc@Temp 1{%
789 \or 0% 1
790 \or 9% 2
791 \or 8% 3
792 \or 7% 4

```

```

793 \or 6% 5
794 \or 5% 6
795 \or 4% 7
796 \or 3% 8
797 \or 2% 9
798 }
799 \IntCalc@Temp 2{%
800 \or 1% 1
801 \or 0% 2
802 \or 9% 3
803 \or 8% 4
804 \or 7% 5
805 \or 6% 6
806 \or 5% 7
807 \or 4% 8
808 \or 3% 9
809 }
810 \IntCalc@Temp 3{%
811 \or 2% 1
812 \or 1% 2
813 \or 0% 3
814 \or 9% 4
815 \or 8% 5
816 \or 7% 6
817 \or 6% 7
818 \or 5% 8
819 \or 4% 9
820 }
821 \IntCalc@Temp 4{%
822 \or 3% 1
823 \or 2% 2
824 \or 1% 3
825 \or 0% 4
826 \or 9% 5
827 \or 8% 6
828 \or 7% 7
829 \or 6% 8
830 \or 5% 9
831 }
832 \IntCalc@Temp 5{%
833 \or 4% 1
834 \or 3% 2
835 \or 2% 3
836 \or 1% 4
837 \or 0% 5
838 \or 9% 6
839 \or 8% 7
840 \or 7% 8
841 \or 6% 9
842 }
843 \IntCalc@Temp 6{%
844 \or 5% 1
845 \or 4% 2
846 \or 3% 3
847 \or 2% 4
848 \or 1% 5
849 \or 0% 6
850 \or 9% 7
851 \or 8% 8
852 \or 7% 9
853 }
854 \IntCalc@Temp 7{%

```

```

855 \or 6% 1
856 \or 5% 2
857 \or 4% 3
858 \or 3% 4
859 \or 2% 5
860 \or 1% 6
861 \or 0% 7
862 \or 9% 8
863 \or 8% 9
864 }
865 \IntCalc@Temp 8{%
866 \or 7% 1
867 \or 6% 2
868 \or 5% 3
869 \or 4% 4
870 \or 3% 5
871 \or 2% 6
872 \or 1% 7
873 \or 0% 8
874 \or 9% 9
875 }
876 \IntCalc@Temp 9{%
877 \or 8% 1
878 \or 7% 2
879 \or 6% 3
880 \or 5% 4
881 \or 4% 5
882 \or 3% 6
883 \or 2% 7
884 \or 1% 8
885 \or 0% 9
886 }

```

2.5.5 Shl, Shr

\intcalcShl

```

887 \def\intcalcShl#1{%
888 \number\expandafter\IntCalc@ShlSwitch\number#1! %
889 }

```

\IntCalc@ShlSwitch

```

890 \def\IntCalc@ShlSwitch#1!{%
891 \ifnum#1<\z@
892 0\IntCalcError:ShlNegativeNumber%
893 \else
894 \csname IntCalc@Empty%
895 \IntCalc@Shl#1!%
896 \fi
897 }

```

\IntCal@ShlDigit

```

898 \def\IntCalc@Shl#1#2{%
899 \ifx#2!%
900 \csname IntCalc@ShlDigit#1\endcsname0%
901 \else
902 \csname IntCalc@ShlDigit#1%
903 \@ReturnAfterFi{%
904 \IntCalc@Shl#2%
905 }%
906 \fi
907 }

```



```

\IntCalc@ShlDigit0
908 \expandafter\def\csname IntCalc@ShlDigit0\endcsname{%
909   \endcsname0%
910 }

\IntCalc@ShlDigit[1-9]
911 \def\IntCalc@Temp#1#2#3#4#5{%
912   \expandafter\def\csname IntCalc@ShlDigit#1\endcsname##1{%
913     \expandafter\endcsname
914     \ifcase##1 %
915       #2#3%
916     \else
917       #4#5%
918     \fi
919   }%
920 }
921 \IntCalc@Temp 10203
922 \IntCalc@Temp 20405
923 \IntCalc@Temp 30607
924 \IntCalc@Temp 40809
925 \IntCalc@Temp 51011
926 \IntCalc@Temp 61213
927 \IntCalc@Temp 71415
928 \IntCalc@Temp 81617
929 \IntCalc@Temp 91819

\intcalcShr
930 \def\intcalcShr#1{%
931   \number\expandafter\IntCalc@ShrSwitch\number#1! %
932 }

\IntCalc@ShrSwitch
933 \def\IntCalc@ShrSwitch#1!{%
934   \ifnum#1<\z@
935     0\IntCalcError:ShrNegativeNumber%
936   \else
937     \IntCalc@Shr#1!%
938   \fi
939 }

\IntCalc@Shr
940 \def\IntCalc@Shr#1#2{%
941   \IntCalc@ShrDigit#1!%
942   \ifx#2!%
943     \else
944       \@ReturnAfterFi{%
945         \ifodd#1 %
946           \@ReturnAfterElseFi{%
947             \IntCalc@Shr{1#2}%
948           }%
949         \else
950           \expandafter\IntCalc@Shr\expandafter#2%
951         \fi
952       }%
953     \fi
954 }

955 \def\IntCalc@ShrDigit#1!{%
956   \ifcase#1 0% 0
957   \or 0% 1
958   \or 1% 2

```

```

959 \or 1% 3
960 \or 2% 4
961 \or 2% 5
962 \or 3% 6
963 \or 3% 7
964 \or 4% 8
965 \or 4% 9
966 \or 5% 10
967 \or 5% 11
968 \or 6% 12
969 \or 6% 13
970 \or 7% 14
971 \or 7% 15
972 \or 8% 16
973 \or 8% 17
974 \or 9% 18
975 \or 9% 19
976 \fi
977 }

```

2.5.6 \IntCalc@Tim

\IntCalc@Tim Macro \IntCalc@Tim implements “Number *times* digit”.

```

978 \def\IntCalc@Tim#1#2{%
979 \number
980 \ifcase#2 % 0
981 0%
982 \or % 1
983 #1%
984 \else % 2-9
985 \csname IntCalc@Empty%
986 \IntCalc@ProcessTim#2#1!%
987 \fi
988 \IntCalc@Space
989 }

```

\IntCalc@ProcessTim

```

990 \def\IntCalc@ProcessTim#1#2#3{%
991 \ifx#3!%
992 \csname IntCalc@TimDigit#2\endcsname#10%
993 \else
994 \csname IntCalc@TimDigit#2\csname IntCalc@Param#1%
995 \@ReturnAfterFi{%
996 \IntCalc@ProcessTim#1#3%
997 }%
998 \fi
999 }

```

\IntCalc@Param[0-9]

```

1000 \def\IntCalc@Temp#1{%
1001 \expandafter\def\csname IntCalc@Param#1\endcsname{%
1002 \endcsname#1%
1003 }%
1004 }
1005 \IntCalc@Temp 0%
1006 \IntCalc@Temp 1%
1007 \IntCalc@Temp 2%
1008 \IntCalc@Temp 3%
1009 \IntCalc@Temp 4%
1010 \IntCalc@Temp 5%
1011 \IntCalc@Temp 6%
1012 \IntCalc@Temp 7%

```

```

1013 \IntCalc@Temp 8%
1014 \IntCalc@Temp 9%

\IntCalc@TimDigit0
1015 \expandafter\def\csname IntCalc@TimDigit0\endcsname#1#2{%
1016 \endcsname
1017 0#2%
1018 }

\IntCalc@TimDigit1
1019 \expandafter\def\csname IntCalc@TimDigit1\endcsname#1#2{%
1020 \ifcase#2 %
1021 \endcsname 0#1%
1022 \else
1023 \csname IntCalc@AddDigit#1\endcsname #2%
1024 \fi
1025 }

\IntCalc@TimDigit[2-9]
1026 \def\IntCalc@Temp#1#2{%
1027 \expandafter\def\csname IntCalc@TimDigit#1\endcsname##1{%
1028 \expandafter\IntCalc@TimDigitCarry
1029 \number
1030 \ifcase##1 0% 0
1031 #2%
1032 \fi
1033 !%
1034 }%
1035 }
1036 \IntCalc@Temp 2{%
1037 \or 2% 1
1038 \or 4% 2
1039 \or 6% 3
1040 \or 8% 4
1041 \or 10% 5
1042 \or 12% 6
1043 \or 14% 7
1044 \or 16% 8
1045 \or 18% 9
1046 }
1047 \IntCalc@Temp 3{%
1048 \or 3% 1
1049 \or 6% 2
1050 \or 9% 3
1051 \or 12% 4
1052 \or 15% 5
1053 \or 18% 6
1054 \or 21% 7
1055 \or 24% 8
1056 \or 27% 9
1057 }
1058 \IntCalc@Temp 4{%
1059 \or 4% 1
1060 \or 8% 2
1061 \or 12% 3
1062 \or 16% 4
1063 \or 20% 5
1064 \or 24% 6
1065 \or 28% 7
1066 \or 32% 8
1067 \or 36% 9
1068 }

```

```

1069 \IntCalc@Temp 5{%
1070   \or 5% 1
1071   \or 10% 2
1072   \or 15% 3
1073   \or 20% 4
1074   \or 25% 5
1075   \or 30% 6
1076   \or 35% 7
1077   \or 40% 8
1078   \or 45% 9
1079 }
1080 \IntCalc@Temp 6{%
1081   \or 6% 1
1082   \or 12% 2
1083   \or 18% 3
1084   \or 24% 4
1085   \or 30% 5
1086   \or 36% 6
1087   \or 42% 7
1088   \or 48% 8
1089   \or 54% 9
1090 }
1091 \IntCalc@Temp 7{%
1092   \or 7% 1
1093   \or 14% 2
1094   \or 21% 3
1095   \or 28% 4
1096   \or 35% 5
1097   \or 42% 6
1098   \or 49% 7
1099   \or 56% 8
1100   \or 63% 9
1101 }
1102 \IntCalc@Temp 8{%
1103   \or 8% 1
1104   \or 16% 2
1105   \or 24% 3
1106   \or 32% 4
1107   \or 40% 5
1108   \or 48% 6
1109   \or 56% 7
1110   \or 64% 8
1111   \or 72% 9
1112 }
1113 \IntCalc@Temp 9{%
1114   \or 9% 1
1115   \or 18% 2
1116   \or 27% 3
1117   \or 36% 4
1118   \or 45% 5
1119   \or 54% 6
1120   \or 63% 7
1121   \or 72% 8
1122   \or 81% 9
1123 }

```

\IntCalc@TimDigitCarry

```

1124 \def\IntCalc@TimDigitCarry#1!{%
1125   \ifnum#1<10 %
1126     \csname IntCalc@AddDigit#1\expandafter\endcsname
1127   \else
1128     \@ReturnAfterFi{%
1129       \IntCalc@@TimDigitCarry#1!%

```

```

1130 }%
1131 \fi
1132 }

```

\IntCalc@@TimDigitCarry

```

1133 \def\IntCalc@@TimDigitCarry#1#2!#3{%
1134 \csname IntCalc@DigitCarry#1%
1135 \csname IntCalc@AddDigit#2\endcsname #3%
1136 }

```

2.5.7 Mul

\intcalcMul

```

1137 \def\intcalcMul#1#2{%
1138 \number
1139 \expandafter\IntCalc@MulSwitch
1140 \number#1\expandafter!%
1141 \number#2!%
1142 \IntCalc@Space
1143 }

```

\IntCalc@MulSwitch Decision table for \IntCalc@MulSwitch.

$x < 0$	$y < 0$	$x < y$	+	$Mul(-x, -y)$
		else		$Mul(-y, -x)$
	else	$-x > y$	-	$Mul(-x, y)$
		else		$Mul(y, -x)$
else	$y < 0$	$x > -y$	-	$Mul(x, -y)$
		else		$Mul(-y, x)$
	else	$x > y$	+	$Mul(x, y)$
		else		$Mul(y, x)$

```

1144 \def\IntCalc@MulSwitch#1!#2!{%
1145 \ifnum#1<\z@
1146 \ifnum#2<\z@
1147 \ifnum#1<#2 %
1148 \expandafter\IntCalc@Mul\number-#1\expandafter!%
1149 \IntCalc@Gobble#2!%
1150 \else
1151 \expandafter\IntCalc@Mul\number-#2\expandafter!%
1152 \IntCalc@Gobble#1!%
1153 \fi
1154 \else
1155 -%
1156 \ifnum-#1>#2 %
1157 \expandafter\IntCalc@Mul\IntCalc@Gobble#1!#2!%
1158 \else
1159 \expandafter\IntCalc@Mul\number#2\expandafter!%
1160 \IntCalc@Gobble#1!%
1161 \fi
1162 \fi
1163 \else
1164 \ifnum#2<\z@
1165 -%
1166 \ifnum#1>#2 %
1167 \expandafter\IntCalc@Mul\number#1\expandafter!%
1168 \IntCalc@Gobble#2!%
1169 \else
1170 \expandafter\IntCalc@Mul\IntCalc@Gobble#2!#1!%
1171 \fi
1172 \else

```

```

1173     \ifnum#1>#2 %
1174     \IntCalc@Mul#1!#2!%
1175     \else
1176     \IntCalc@Mul#2!#1!%
1177     \fi
1178 \fi
1179 \fi
1180 }

```

\IntCalc@Mul

```

1181 \def\IntCalc@Mul#1!#2!{%
1182 \ifcase#2 %
1183 0%
1184 \or
1185 #1%
1186 \or
1187 \csname IntCalc@Empty%
1188 \expandafter\IntCalc@Shl#1!%
1189 \else
1190 \ifnum#2<10 %
1191 \IntCalc@Tim{#1}#2%
1192 \else
1193 \IntCalc@ProcessMul!#2!#1!%
1194 \fi
1195 \fi
1196 }

```

\IntCalc@Mul

```

1197 \def\IntCalc@ProcessMul#1!#2#3!#4!{%
1198 \ifx\IntCalc@Empty#3\IntCalc@Empty
1199 \expandafter\IntCalc@Add\number
1200 #10\expandafter\expandafter\expandafter!%
1201 \IntCalc@Tim{#4}#2!%
1202 \else
1203 \ifx\IntCalc@Empty#1\IntCalc@Empty
1204 \expandafter\expandafter\expandafter\IntCalc@ProcessMul
1205 \IntCalc@Tim{#4}#2!%
1206 #3!#4!%
1207 \else
1208 \expandafter\IntCalc@ProcessMul\number
1209 \expandafter\IntCalc@Add\number%
1210 #10\expandafter\expandafter\expandafter!%
1211 \IntCalc@Tim{#4}#2!!%
1212 #3!#4!%
1213 \fi
1214 \fi
1215 }

```

2.5.8 Sqr, Fac

\intcalcSqr

```

1216 \def\intcalcSqr#1{%
1217 \number\expandafter\IntCalc@Sqr\number#1! %
1218 }

```

\IntCalc@Sqr

```

1219 \def\IntCalc@Sqr#1#2!{%
1220 \ifx#1-%
1221 \IntCalc@Mul#2!#2!%
1222 \else
1223 \IntCalc@Mul#1#2!#1#2!%

```

```

1224 \fi
1225 }

\intcalcFac

1226 \def\intcalcFac#1{%
1227 \number\expandafter\IntCalc@Fac\number#1! %
1228 }

```

2.5.9 Pow

```

\intcalcPow

1229 \def\intcalcPow#1#2{%
1230 \number\expandafter\IntCalc@Pow
1231 \number\number#1\expandafter!%
1232 \number#2! %
1233 }

\IntCalc@Pow

1234 \def\IntCalc@Pow#1#2!#3#4!{%
1235 \ifcase#3#4 % power = 0
1236 1%
1237 \or % power = 1
1238 #1#2%
1239 \or % power = 2
1240 \ifx#1-%
1241 \IntCalc@Mul#2!#2!%
1242 \else
1243 \IntCalc@Mul#1#2!#1#2!%
1244 \fi
1245 \else
1246 \ifcase#1#2 % basis = 0, power <> 0
1247 0%
1248 \ifx#3-% power < 0
1249 0\IntCalcError:DivisionByZero%
1250 \fi
1251 \or
1252 1% basis = 1
1253 \else
1254 \ifnum#1#2=\m@ne % basis = -1
1255 \ifodd#3#4 %
1256 -%
1257 \fi
1258 1%
1259 \else % |basis| > 1
1260 \ifx#3-% power < 0
1261 0%
1262 \else % power > 2
1263 \ifx#1-% basis < 0
1264 \ifodd#3#4 %
1265 -%
1266 \fi
1267 \IntCalc@PowRec#2!#3#4!1!%
1268 \else
1269 \IntCalc@PowRec#1#2!#3#4!1!%
1270 \fi
1271 \fi
1272 \fi
1273 \fi
1274 \fi
1275 }

```

\IntCalc@PowRec Pow(b, p) {

```

        PowRec(b, p, 1)
    }
    PowRec(b, p, r) {
        if p == 1 then
            return r
        else
            ifodd p then
                return PowRec(b*b, p div 2, r*b) % p div 2 = (p-1)/2
            else
                return PowRec(b*b, p div 2, r)
            fi
        fi
    }
1276 \def\IntCalc@PowRec#1!#2!#3!{%
1277   \ifnum#2=\@ne
1278     \ifnum#1>#3 %
1279       \IntCalc@Mul#1!#3!%
1280     \else
1281       \IntCalc@Mul#3!#1!%
1282     \fi
1283   \else
1284     \expandafter\IntCalc@PowRec
1285     \number\IntCalc@Mul#1!#1!\expandafter!%
1286     \number\intcalcShr{#2}\expandafter!%
1287     \number
1288     \ifodd#2 %
1289       \ifnum#1>#3 %
1290         \IntCalc@Mul#1!#3!%
1291       \else
1292         \IntCalc@Mul#3!#1!%
1293       \fi
1294     \else
1295       #3%
1296     \fi
1297     \expandafter!%
1298   \fi
1299 }

```

2.5.10 Div

\intcalcDiv

```

1300 \def\intcalcDiv#1#2{%
1301   \number\expandafter\IntCalc@Div
1302   \number\number#1\expandafter!%
1303   \number#2! %
1304 }

```

\IntCalc@Div

```

1305 \def\IntCalc@Div#1!#2!{%
1306   \ifcase#2 %
1307     0\IntCalcError:DivisionByZero%
1308   \else
1309     \ifcase#1 %
1310       0%
1311     \else
1312       \expandafter\IntCalc@DivSwitch
1313       \number#1\expandafter!%
1314       \number#2!%
1315     \fi
1316   \fi
1317 }

```


\IntCalc@DivSwitch Decision table for \IntCalc@DivSwitch.

$x < 0$	$y < 0$	$x < y$	+	$\text{Div}(-x, -y)$
		else		$\text{Div}(-y, -x)$
	else	$-x > y$	-	$\text{Div}(-x, y)$
		else		$\text{Div}(y, -x)$
else	$y < 0$	$x > -y$	-	$\text{Div}(x, -y)$
		else		$\text{Div}(-y, x)$
	else	$x > y$	+	$\text{Div}(x, y)$
		else		$\text{Div}(y, x)$

```

1318 \def\IntCalc@DivSwitch#1!#2!{%
1319   \ifnum#1<\z@
1320     \ifnum#2<\z@
1321       \expandafter\IntCalc@@Div\number-#1\expandafter!%
1322       \IntCalc@Gobble#2!%
1323     \else
1324       -%
1325       \expandafter\IntCalc@@Div\IntCalc@Gobble#1!#2!%
1326     \fi
1327   \else
1328     \ifnum#2<\z@
1329       -%
1330       \expandafter\IntCalc@@Div\number#1\expandafter!%
1331       \IntCalc@Gobble#2!%
1332     \else
1333       \IntCalc@@Div#1!#2!%
1334     \fi
1335   \fi
1336 }

```

\IntCalc@@Div

```

1337 \def\IntCalc@@Div#1!#2!{%
1338   \ifnum#1>#2 %
1339     \ifcase#2 % 0 already caught
1340 ?     \IntCalcError:ThisCannotHappen%
1341     \or % 1
1342       #1%
1343     \or % 2
1344       \IntCalc@Shr#1!%
1345     \else
1346       \IntCalc@DivStart!#1!#2!#2!%
1347     \fi
1348   \else
1349     \ifnum#1=#2 %
1350       1%
1351     \else
1352       0%
1353     \fi
1354   \fi
1355 }

```

\IntCalc@DivStart

```

1356 \def\IntCalc@DivStart#1!#2#3!#4#5{%
1357   \ifx#5!%
1358     \@ReturnAfterElseFi{%
1359       \IntCalc@DivStartI{#1#2}#3=!%
1360     }%
1361   \else
1362     \@ReturnAfterFi{%
1363       \IntCalc@DivStart{#1#2}!#3!#5%

```

```

1364     }%
1365     \fi
1366 }

\IntCalc@StartI
1367 \def\IntCalc@DivStartI#1!#2!{%
1368     \expandafter\IntCalc@DivStartII
1369     \number#2\expandafter\expandafter\expandafter!%
1370     \intcalcShl{#2}!%
1371     #1!%
1372 }

\IntCalc@StartII
1373 \def\IntCalc@DivStartII#1!#2!{%
1374     \expandafter\IntCalc@DivStartIII
1375     \number#1\expandafter!%
1376     \number#2\expandafter\expandafter\expandafter!%
1377     \intcalcShl{#2}!%
1378 }

\IntCalc@StartIII
1379 \def\IntCalc@DivStartIII#1!#2!#3!{%
1380     \expandafter\IntCalc@DivStartIV
1381     \number#1\expandafter!%
1382     \number#2\expandafter!%
1383     \number#3\expandafter!%
1384     \number\IntCalc@Add#3!#2!\expandafter\expandafter\expandafter!%
1385     \intcalcShl{#3}!%
1386 }

\IntCalc@StartIV
1387 \def\IntCalc@DivStartIV#1!#2!#3!#4!#5!#6!{%
1388     \IntCalc@ProcessDiv#6!#1!#2!#3!#4!#5!/%
1389 }

\IntCalc@ProcessDiv
1390 \def\IntCalc@ProcessDiv#1#2#3!#4!#5!#6!#7!#8!#9/{%
1391     #9%
1392     \ifnum#1<#4 % 0
1393         0%
1394         \ifx#2=%
1395             \else
1396                 \IntCalc@ProcessDiv{#1#2}#3!#4!#5!#6!#7!#8!%
1397             \fi
1398     \else % 1-9
1399         \ifnum#1<#5 % 1
1400             1%
1401             \ifx#2=%
1402                 \else
1403                     \expandafter\IntCalc@ProcessDiv\expandafter{%
1404                         \number\IntCalc@Sub#1!#4!%
1405                         #2%
1406                     }#3!#4!#5!#6!#7!#8!%
1407                 \fi
1408     \else % 2-9
1409         \ifnum#1<#7 % 2 3 4 5
1410             \ifnum#1<#6 % 2 3
1411                 \@ReturnAfterElseFi{%
1412                     \expandafter\IntCalc@@ProcessDiv
1413                     \number\IntCalc@Sub#1!#5!%
1414                     23%

```

```

1415     }%
1416     \else % 4 5
1417         \@ReturnAfterFi{%
1418             \expandafter\IntCalc@@ProcessDiv
1419             \number\IntCalc@Sub#1!#6!!%
1420             45%
1421         }%
1422     \fi
1423     #2#3!#4!#5!#6!#7!#8!%
1424 \else % 6 7 8 9
1425     \ifnum#1<#8 % 6 7
1426         \@ReturnAfterElseFi{%
1427             \expandafter\IntCalc@@ProcessDiv
1428             \number\IntCalc@Sub#1!#7!!%
1429             67%
1430         }%
1431     \else % 8 9
1432         \@ReturnAfterFi{%
1433             \expandafter\IntCalc@@ProcessDiv
1434             \number\IntCalc@Sub#1!#8!!%
1435             89%
1436         }%
1437     \fi
1438     #2#3!#4!#5!#6!#7!#8!%
1439 \fi
1440 \fi
1441 \fi
1442 \ifx#2=%
1443     \expandafter\IntCalc@Gobble
1444 \fi
1445 /%
1446 }

```

\IntCalc@@ProcessDiv

```

1447 \def\IntCalc@@ProcessDiv#1!#2#3#4#5!#6!{%
1448     \ifnum#1<#6 %
1449         #2%
1450         \@ReturnAfterElseFi{%
1451             \ifx#4=%
1452                 \expandafter\IntCalc@CleanupIV
1453             \else
1454                 \@ReturnAfterFi{%
1455                     \IntCalc@ProcessDiv{#1#4}#5!#6!%
1456                 }%
1457             \fi
1458         }%
1459     \else
1460         #3%
1461         \@ReturnAfterFi{%
1462             \ifx#4=%
1463                 \expandafter\IntCalc@CleanupIV
1464             \else
1465                 \@ReturnAfterFi{%
1466                     \expandafter\IntCalc@ProcessDiv\expandafter{%
1467                         \number\IntCalc@Sub#1!#6!\IntCalc@Space
1468                         #4%
1469                     }#5!#6!%
1470                 }%
1471             \fi
1472         }%
1473     \fi
1474 }

```

\IntCalc@CleanupIV

```
1475 \def\IntCalc@CleanupIV#1!#2!#3!#4!{}
```

2.5.11 Mod

\intcalcMod

```
1476 \def\intcalcMod#1#2{%
1477   \number\expandafter\IntCalc@Mod
1478   \number\number#1\expandafter!%
1479   \number#2! %
1480 }
```

\intcalc@Mod Pseudocode/decision table for \intcalc@Mod.

```
if      y = 0  DivisionByZero
elsif   y < 0  - Mod(-x, -y)
elsif   x = 0  0
elsif   y = 1  0
elsif   y = 2  ifodd(x) ? 1 : 0
elsif   x < 0   $z \leftarrow x + (x/y) * x;$   (z < 0) ? z + x : z
else     x - (x/y) * x
```

```
1481 \def\IntCalc@Mod#1!#2!{%
1482   \ifcase#2 %
1483     0\IntCalcError:DivisionByZero%
1484   \else
1485     \ifnum#2<\z@
1486       -%
1487       \expandafter\IntCalc@Mod
1488       \number-#1\expandafter!%
1489       \number-#2!%
1490     \else
1491       \ifcase#1 %
1492         0%
1493       \else
1494         \ifcase#2 % 0 already caught
1495 ?       \IntCalcError:ThisCannotHappen%
1496         \or % 1
1497         0%
1498         \or % 2
1499         \ifodd#1 %
1500         1%
1501         \else
1502         0%
1503         \fi
1504       \else
1505         \ifnum#1<\z@
1506         \expandafter\IntCalc@ModShift
1507         \number-%
1508         \expandafter\IntCalc@Sub
1509         \number\IntCalc@Gobble#1\expandafter!%
1510         \number\intcalcMul{#2}{%
1511         \expandafter\IntCalc@Div\IntCalc@Gobble#1!#2!%
1512         }!%
1513         !#2!%
1514       \else
1515         \expandafter\IntCalc@Sub\number#1\expandafter!%
1516         \number\intcalcMul{#2}{\IntCalc@Div#1!#2!}%
1517       \fi
1518     \fi
1519   \fi
```

```

1520 \fi
1521 \fi
1522 }

```

`\IntCalc@ModShift`

```

1523 \def\IntCalc@ModShift#1!#2!{%
1524 \ifnum#1<\z@
1525 \expandafter\IntCalc@Sub\number#2\expandafter!%
1526 \IntCalc@Gobble#1!%
1527 \else
1528 #1%
1529 \fi
1530 }

```

2.5.12 Help macros

`\IntCalc@Empty`

```

1531 \def\IntCalc@Empty{}

```

`\IntCalc@Gobble`

```

1532 \def\IntCalc@Gobble#1{}

```

`\@ReturnAfterFi`

```

1533 \long\def\@ReturnAfterFi#1\fi{\fi#1}%

```

`\@ReturnAfterElseFi`

```

1534 \long\def\@ReturnAfterElseFi#1\else#2\fi{\fi#1}%
1535 \IntCalc@AtEnd
1536 </package>

```

3 Test

3.1 Catcode checks for loading

```

1537 <*test1>
1538 \catcode'\@=11 %
1539 \def\RestoreCatcodes{}
1540 \count@=0 %
1541 \loop
1542 \edef\RestoreCatcodes{%
1543 \RestoreCatcodes
1544 \catcode\the\count@=\the\catcode\count@\relax
1545 }%
1546 \ifnum\count@<255 %
1547 \advance\count@\@ne
1548 \repeat
1549
1550 \def\RangeCatcodeInvalid#1#2{%
1551 \count@=#1\relax
1552 \loop
1553 \catcode\count@=15 %
1554 \ifnum\count@<#2\relax
1555 \advance\count@\@ne
1556 \repeat
1557 }
1558 \def\Test{%
1559 \RangeCatcodeInvalid{0}{47}%
1560 \RangeCatcodeInvalid{58}{64}%
1561 \RangeCatcodeInvalid{91}{96}%

```

```

1562 \RangeCatcodeInvalid{123}{255}%
1563 \catcode'\@=12 %
1564 \catcode'\=0 %
1565 \catcode'\{=1 %
1566 \catcode'\}=2 %
1567 \catcode'\#=6 %
1568 \catcode'\[=12 %
1569 \catcode'\]=12 %
1570 \catcode'\%=14 %
1571 \catcode'\ =10 %
1572 \catcode13=5 %
1573 \input intcalc.sty\relax
1574 \RestoreCatcodes
1575 }
1576 \Test
1577 \csname @@end\endcsname
1578 \end
1579 </test1>

```

3.2 Macro tests

3.2.1 Preamble with test macro definitions

```

1580 <*test2 | test3 | test4>
1581 \NeedsTeXFormat{LaTeX2e}
1582 \nofiles
1583 \documentclass{article}
1584 <noetex> \let\SavedNumexpr\numexpr
1585 <noetex> \let\numexpr\UNDEFINED
1586 \makeatletter
1587 \chardef\IntCalc@TestMode=1 %
1588 \makeatother
1589 \usepackage{intcalc}[2007/09/09]
1590 <noetex> \let\numexpr\SavedNumexpr
1591 \usepackage{qstest}
1592 \IncludeTests{*}
1593 \LogTests{log}{*}{*}
1594 </test2 | test3 | test4>
1595 <*test2 | test3>
1596 \newcommand*\TestSpaceAtEnd}[1]{%
1597 <noetex> \let\SavedNumexpr\numexpr
1598 <noetex> \let\numexpr\UNDEFINED
1599 \edef\resultA{#1}%
1600 \edef\resultB{#1 }%
1601 <noetex> \let\numexpr\SavedNumexpr
1602 \Expect*{\resultA\space}*{\resultB}%
1603 }
1604 \newcommand*\TestResult}[2]{%
1605 <noetex> \let\SavedNumexpr\numexpr
1606 <noetex> \let\numexpr\UNDEFINED
1607 \edef\result{#1}%
1608 <noetex> \let\numexpr\SavedNumexpr
1609 \Expect*{\result}{#2}%
1610 }
1611 \newcommand*\TestResultTwoExpansions}[2]{%
1612 <*noetex>
1613 \begingroup
1614 \let\numexpr\UNDEFINED
1615 \expandafter\expandafter\expandafter
1616 \endgroup
1617 </noetex>
1618 \expandafter\expandafter\expandafter\Expect
1619 \expandafter\expandafter\expandafter{#1}{#2}%

```

```

1620 }
1621 \newcount\TestCount
1622 <etex>\newcommand*{\TestArg}[1]{\numexpr#1\relax}
1623 <noetex>\newcommand*{\TestArg}[1]{#1}
1624 \newcommand*{\TestTeXDivide}[2]{%
1625   \TestCount=\TestArg{#1}\relax
1626   \divide\TestCount by \TestArg{#2}\relax
1627   \Expect*{\intcalcdDiv{#1}{#2}}*{\the\TestCount}%
1628 }
1629 \newcommand*{\Test}[2]{%
1630   \TestResult{#1}{#2}%
1631   \TestResultTwoExpansions{#1}{#2}%
1632   \TestSpaceAtEnd{#1}%
1633 }
1634 \newcommand*{\TestExch}[2]{\Test{#2}{#1}}
1635 \newcommand*{\TestInv}[2]{%
1636   \Test{\intcalcdInv{#1}}{#2}%
1637 }
1638 \newcommand*{\TestAbs}[2]{%
1639   \Test{\intcalcdAbs{#1}}{#2}%
1640 }
1641 \newcommand*{\TestSgn}[2]{%
1642   \Test{\intcalcdSgn{#1}}{#2}%
1643 }
1644 \newcommand*{\TestMin}[3]{%
1645   \Test{\intcalcdMin{#1}{#2}}{#3}%
1646 }
1647 \newcommand*{\TestMax}[3]{%
1648   \Test{\intcalcdMax{#1}{#2}}{#3}%
1649 }
1650 \newcommand*{\TestCmp}[3]{%
1651   \Test{\intcalcdCmp{#1}{#2}}{#3}%
1652 }
1653 \newcommand*{\TestInc}[2]{%
1654   \Test{\intcalcdInc{#1}}{#2}%
1655 }
1656 \newcommand*{\TestDec}[2]{%
1657   \Test{\intcalcdDec{#1}}{#2}%
1658 }
1659 \newcommand*{\TestAdd}[3]{%
1660   \Test{\intcalcdAdd{#1}{#2}}{#3}%
1661 }
1662 \newcommand*{\TestSub}[3]{%
1663   \Test{\intcalcdSub{#1}{#2}}{#3}%
1664 }
1665 \newcommand*{\TestShl}[2]{%
1666   \Test{\intcalcdShl{#1}}{#2}%
1667 }
1668 \newcommand*{\TestShr}[2]{%
1669   \Test{\intcalcdShr{#1}}{#2}%
1670 }
1671 \newcommand*{\TestMul}[3]{%
1672   \Test{\intcalcdMul{#1}{#2}}{#3}%
1673 }
1674 \newcommand*{\TestSqr}[2]{%
1675   \Test{\intcalcdSqr{#1}}{#2}%
1676 }
1677 \newcommand*{\TestFac}[2]{%
1678   \expandafter\TestExch\expandafter{\the\numexpr#2}{\intcalcdFac{#1}}%
1679 }
1680 \newcommand*{\TestPow}[3]{%
1681   \Test{\intcalcdPow{#1}{#2}}{#3}%

```

```

1682 }
1683 \newcommand*{\TestDiv}[3]{%
1684   \Test{\intcalcdDiv{#1}{#2}}{#3}%
1685   \TestTeXDivide{#1}{#2}%
1686 }
1687 \newcommand*{\TestMod}[3]{%
1688   \Test{\intcalcMod{#1}{#2}}{#3}%
1689 }
1690 </test2 | test3>
1691 <*test4>
1692 \newcommand*{\TestDo}[2]{%
1693   \ifcase\numexpr#2\relax
1694   \else
1695     \edef\temp{\intcalcMod{#1}{#2}}%
1696     \Expect*{%
1697       \the\numexpr
1698       \intcalcMul{%
1699         \intcalcdDiv{\intcalcAbs{#1}}{\intcalcAbs{#2}}%
1700       }{\intcalcAbs{#2}}%
1701       +\intcalcMod{\intcalcAbs{#1}}{\intcalcAbs{#2}}\relax
1702     }*\the\numexpr\intcalcAbs{#1}\relax}%
1703   \fi
1704 }
1705 \newcommand*{\TestOne}[2]{%
1706   \TestDo{#1}{#1}%
1707 }
1708 \newcommand*{\TestTwo}[3]{%
1709   \TestDo{#1}{#2}%
1710   \TestDo{#2}{#1}%
1711 }
1712 \let\TestInv\TestOne
1713 \let\TestAbs\TestOne
1714 \let\TestSgn\TestOne
1715 \let\TestMin\TestTwo
1716 \let\TestMax\TestTwo
1717 \let\TestCmp\TestTwo
1718 \let\TestInc\TestOne
1719 \let\TestDec\TestOne
1720 \let\TestAdd\TestTwo
1721 \let\TestSub\TestTwo
1722 \let\TestShl\TestOne
1723 \let\TestShr\TestOne
1724 \let\TestMul\TestTwo
1725 \let\TestSqr\TestOne
1726 \def\TestFac#1#2{}
1727 \let\TestPow\TestTwo
1728 \let\TestDiv\TestTwo
1729 \let\TestMod\TestTwo
1730 </test4>

```

3.2.2 Test sets

```

1731 <*test2 | test3 | test4>
1732 \makeatletter
1733
1734 \begin{qstest}{inv}{inv}%
1735   \TestInv{0}{0}%
1736   \TestInv{1}{-1}%
1737   \TestInv{-1}{1}%
1738   \TestInv{10}{-10}%
1739   \TestInv{-10}{10}%
1740   \TestInv{2147483647}{-2147483647}%
1741   \TestInv{-2147483647}{2147483647}%
1742   \TestInv{ 0 }{0}%

```



```

1743 \TestInv{ 1 }{-1}%
1744 \TestInv{--1}{-1}%
1745 \TestInv{\z@}{0}%
1746 \TestInv{\@one}{-1}%
1747 \TestInv{\m@ne}{1}%
1748 <*etex>
1749 \TestInv{-10+30}{-20}%
1750 \TestInv{10-30}{20}%
1751 </etex>
1752 \end{qstest}
1753
1754 \begin{qstest}{abs}{abs}%
1755 \TestAbs{0}{0}%
1756 \TestAbs{1}{1}%
1757 \TestAbs{-1}{1}%
1758 \TestAbs{10}{10}%
1759 \TestAbs{-10}{10}%
1760 \TestAbs{2147483647}{2147483647}%
1761 \TestAbs{-2147483647}{2147483647}%
1762 \TestAbs{ 0 }{0}%
1763 \TestAbs{ 1 }{1}%
1764 \TestAbs{--1}{1}%
1765 \TestAbs{\z@}{0}%
1766 \TestAbs{\@one}{1}%
1767 \TestAbs{\m@ne}{1}%
1768 <*etex>
1769 \TestAbs{-10+30}{20}%
1770 \TestAbs{10-30}{20}%
1771 </etex>
1772 \end{qstest}
1773
1774 \begin{qstest}{sign}{sign}%
1775 \TestSgn{0}{0}%
1776 \TestSgn{1}{1}%
1777 \TestSgn{-1}{-1}%
1778 \TestSgn{10}{1}%
1779 \TestSgn{-10}{-1}%
1780 \TestSgn{2147483647}{1}%
1781 \TestSgn{-2147483647}{-1}%
1782 \TestSgn{ 0 }{0}%
1783 \TestSgn{ 2 }{1}%
1784 \TestSgn{ -2 }{-1}%
1785 \TestSgn{--2}{1}%
1786 \TestSgn{\z@}{0}%
1787 \TestSgn{\@one}{1}%
1788 \TestSgn{\m@ne}{-1}%
1789 <*etex>
1790 \TestSgn{-10+30}{1}%
1791 \TestSgn{10-30}{-1}%
1792 </etex>
1793 \end{qstest}
1794
1795 \begin{qstest}{min}{min}%
1796 \TestMin{0}{1}{0}%
1797 \TestMin{1}{0}{0}%
1798 \TestMin{-10}{-20}{-20}%
1799 \TestMin{ 1 }{ 2 }{1}%
1800 \TestMin{ 2 }{ 1 }{1}%
1801 \TestMin{1}{1}{1}%
1802 \TestMin{\z@}{\@one}{0}%
1803 \TestMin{\@one}{\m@ne}{-1}%
1804 <*etex>

```

```

1805 \TestMin{1+2}{3+4}{3}%
1806 </etex>
1807 \end{qstest}
1808
1809 \begin{qstest}{max}{max}%
1810 \TestMax{0}{1}{1}%
1811 \TestMax{1}{0}{1}%
1812 \TestMax{-10}{-20}{-10}%
1813 \TestMax{ 1 }{ 2 }{2}%
1814 \TestMax{ 2 }{ 1 }{2}%
1815 \TestMax{1}{1}{1}%
1816 \TestMax{\z0}{\@ne}{1}%
1817 \TestMax{\@ne}{\m@ne}{1}%
1818 <*etex>
1819 \TestMax{1+2}{3+4}{7}%
1820 </etex>
1821 \end{qstest}
1822
1823 \begin{qstest}{cmp}{cmp}%
1824 \TestCmp{0}{0}{0}%
1825 \TestCmp{-21}{17}{-1}%
1826 \TestCmp{3}{4}{-1}%
1827 \TestCmp{-10}{-10}{0}%
1828 \TestCmp{-10}{-11}{1}%
1829 \TestCmp{100}{5}{1}%
1830 \TestCmp{2147483647}{-2147483647}{1}%
1831 \TestCmp{-2147483647}{2147483647}{-1}%
1832 \TestCmp{2147483647}{2147483647}{0}%
1833 \TestCmp{\z0}{\@ne}{-1}%
1834 \TestCmp{\@ne}{\m@ne}{1}%
1835 \TestCmp{ 4 }{ 5 }{-1}%
1836 \TestCmp{ -3 }{ -7 }{1}%
1837 <*etex>
1838 \TestCmp{1+2}{3+4}{-1}%
1839 </etex>
1840 \end{qstest}
1841
1842 \begin{qstest}{fac}{fac}
1843 \TestFac{0}{1}%
1844 \TestFac{1}{1}%
1845 \TestFac{2}{2}%
1846 \TestFac{3}{2*3}%
1847 \TestFac{4}{2*3*4}%
1848 \TestFac{5}{2*3*4*5}%
1849 \TestFac{6}{2*3*4*5*6}%
1850 \TestFac{7}{2*3*4*5*6*7}%
1851 \TestFac{8}{2*3*4*5*6*7*8}%
1852 \TestFac{9}{2*3*4*5*6*7*8*9}%
1853 \TestFac{10}{2*3*4*5*6*7*8*9*10}%
1854 \TestFac{11}{2*3*4*5*6*7*8*9*10*11}%
1855 \TestFac{12}{2*3*4*5*6*7*8*9*10*11*12}%
1856 \end{qstest}
1857
1858 \begin{qstest}{inc}{inc}%
1859 \TestInc{0}{1}%
1860 \TestInc{1}{2}%
1861 \TestInc{-1}{0}%
1862 \TestInc{10}{11}%
1863 \TestInc{-10}{-9}%
1864 \TestInc{999}{1000}%
1865 \TestInc{-1000}{-999}%
1866 \TestInc{129}{130}%

```

```

1867 \TestInc{2147483646}{2147483647}%
1868 \TestInc{-2147483647}{-2147483646}%
1869 \end{qstest}
1870
1871 \begin{qstest}{dec}{dec}%
1872 \TestDec{0}{-1}%
1873 \TestDec{1}{0}%
1874 \TestDec{-1}{-2}%
1875 \TestDec{10}{9}%
1876 \TestDec{-10}{-11}%
1877 \TestDec{1000}{999}%
1878 \TestDec{-999}{-1000}%
1879 \TestDec{130}{129}%
1880 \TestDec{2147483647}{2147483646}%
1881 \TestDec{-2147483646}{-2147483647}%
1882 \end{qstest}
1883
1884 \begin{qstest}{add}{add}%
1885 \TestAdd{0}{0}{0}%
1886 \TestAdd{1}{0}{1}%
1887 \TestAdd{0}{1}{1}%
1888 \TestAdd{1}{2}{3}%
1889 \TestAdd{-1}{-1}{-2}%
1890 \TestAdd{2147483646}{1}{2147483647}%
1891 \TestAdd{-2147483647}{2147483647}{0}%
1892 \TestAdd{20}{-5}{15}%
1893 \TestAdd{-4}{-1}{-5}%
1894 \TestAdd{-1}{-4}{-5}%
1895 \TestAdd{-4}{1}{-3}%
1896 \TestAdd{-1}{4}{3}%
1897 \TestAdd{4}{-1}{3}%
1898 \TestAdd{1}{-4}{-3}%
1899 \TestAdd{-4}{-1}{-5}%
1900 \TestAdd{-1}{-4}{-5}%
1901 \TestAdd{ -4 }{ -1 }{-5}%
1902 \TestAdd{ -1 }{ -4 }{-5}%
1903 \TestAdd{ -4 }{ 1 }{-3}%
1904 \TestAdd{ -1 }{ 4 }{3}%
1905 \TestAdd{ 4 }{ -1 }{3}%
1906 \TestAdd{ 1 }{ -4 }{-3}%
1907 \TestAdd{ -4 }{ -1 }{-5}%
1908 \TestAdd{ -1 }{ -4 }{-5}%
1909 \TestAdd{876543210}{111111111}{987654321}%
1910 \TestAdd{999999999}{2}{1000000001}%
1911 \langle *etex\rangle
1912 \TestAdd{100}{50+150}{300}%
1913 \TestAdd{2147483647}{10-2147483647}{10}%
1914 \langle /etex\rangle
1915 \end{qstest}
1916
1917 \begin{qstest}{sub}{sub}
1918 \TestSub{0}{0}{0}%
1919 \TestSub{1}{0}{1}%
1920 \TestSub{1}{2}{-1}%
1921 \TestSub{-1}{-1}{0}%
1922 \TestSub{2147483646}{-1}{2147483647}%
1923 \TestSub{-2147483647}{-2147483647}{0}%
1924 \TestSub{-4}{-1}{-3}%
1925 \TestSub{-1}{-4}{3}%
1926 \TestSub{-4}{1}{-5}%
1927 \TestSub{-1}{4}{-5}%
1928 \TestSub{4}{-1}{5}%

```

```

1929 \TestSub{1}{-4}{5}%
1930 \TestSub{-4}{-1}{-3}%
1931 \TestSub{-1}{-4}{3}%
1932 \TestSub{ -4 }{ -1 }{-3}%
1933 \TestSub{ -1 }{ -4 }{3}%
1934 \TestSub{ -4 }{ 1 }{-5}%
1935 \TestSub{ -1 }{ 4 }{-5}%
1936 \TestSub{ 4 }{ -1 }{5}%
1937 \TestSub{ 1 }{ -4 }{5}%
1938 \TestSub{ -4 }{ -1 }{-3}%
1939 \TestSub{ -1 }{ -4 }{3}%
1940 \TestSub{1000000000}{2}{999999998}%
1941 \TestSub{987654321}{111111111}{876543210}%
1942 <*etex>
1943 \TestSub{100}{50+150}{-100}%
1944 \TestSub{2147483647}{-10+2147483647}{10}%
1945 </etex>
1946 \end{qstest}
1947
1948 \begin{qstest}{shl}{shl}
1949 \TestShl{0}{0}%
1950 \TestShl{1}{2}%
1951 \TestShl{5621}{11242}%
1952 \TestShl{1073741823}{2147483646}%
1953 \end{qstest}
1954
1955 \begin{qstest}{shr}{shr}
1956 \TestShr{0}{0}%
1957 \TestShr{1}{0}%
1958 \TestShr{2}{1}%
1959 \TestShr{3}{1}%
1960 \TestShr{4}{2}%
1961 \TestShr{5}{2}%
1962 \TestShr{6}{3}%
1963 \TestShr{7}{3}%
1964 \TestShr{8}{4}%
1965 \TestShr{9}{4}%
1966 \TestShr{10}{5}%
1967 \TestShr{11}{5}%
1968 \TestShr{12}{6}%
1969 \TestShr{13}{6}%
1970 \TestShr{14}{7}%
1971 \TestShr{15}{7}%
1972 \TestShr{16}{8}%
1973 \TestShr{17}{8}%
1974 \TestShr{18}{9}%
1975 \TestShr{19}{9}%
1976 \TestShr{20}{10}%
1977 \TestShr{21}{10}%
1978 \TestShr{22}{11}%
1979 \TestShr{11241}{5620}%
1980 \TestShr{73054202}{36527101}%
1981 \TestShr{2147483646}{1073741823}%
1982 \end{qstest}
1983
1984 \begin{qstest}{mul}{mul}
1985 \TestMul{0}{0}{0}%
1986 \TestMul{1}{0}{0}%
1987 \TestMul{0}{1}{0}%
1988 \TestMul{1}{1}{1}%
1989 \TestMul{3}{1}{3}%
1990 \TestMul{1}{-3}{-3}%

```

```

1991 \TestMul{-4}{-5}{20}%
1992 \TestMul{3}{7}{21}%
1993 \TestMul{7}{3}{21}%
1994 \TestMul{3}{-7}{-21}%
1995 \TestMul{7}{-3}{-21}%
1996 \TestMul{-3}{7}{-21}%
1997 \TestMul{-7}{3}{-21}%
1998 \TestMul{-3}{-7}{21}%
1999 \TestMul{-7}{-3}{21}%
2000 \TestMul{12}{11}{132}%
2001 \TestMul{999}{333}{332667}%
2002 \TestMul{1000}{4321}{4321000}%
2003 \TestMul{12345}{173955}{2147474475}%
2004 \TestMul{1073741823}{2}{2147483646}%
2005 \TestMul{2}{1073741823}{2147483646}%
2006 \TestMul{-1073741823}{2}{-2147483646}%
2007 \TestMul{2}{-1073741823}{-2147483646}%
2008 <*etex>
2009 \TestMul{2+3}{5+7}{60}%
2010 \TestMul{2147483647}{2147483647/2147483647}{2147483647}%
2011 </etex>
2012 \end{qstest}
2013
2014 \begin{qstest}{sqr}{sqr}
2015 \TestSqr{0}{0}%
2016 \TestSqr{1}{1}%
2017 \TestSqr{2}{4}%
2018 \TestSqr{3}{9}%
2019 \TestSqr{4}{16}%
2020 \TestSqr{9}{81}%
2021 \TestSqr{10}{100}%
2022 \TestSqr{46340}{2147395600}%
2023 \TestSqr{-1}{1}%
2024 \TestSqr{-2}{4}%
2025 \TestSqr{-46340}{2147395600}%
2026 \end{qstest}
2027
2028 \begin{qstest}{pow}{pow}
2029 \TestPow{-2}{0}{1}%
2030 \TestPow{-1}{0}{1}%
2031 \TestPow{0}{0}{1}%
2032 \TestPow{1}{0}{1}%
2033 \TestPow{2}{0}{1}%
2034 \TestPow{3}{0}{1}%
2035 \TestPow{-2}{1}{-2}%
2036 \TestPow{-1}{1}{-1}%
2037 \TestPow{1}{1}{1}%
2038 \TestPow{2}{1}{2}%
2039 \TestPow{3}{1}{3}%
2040 \TestPow{-2}{2}{4}%
2041 \TestPow{-1}{2}{1}%
2042 \TestPow{0}{2}{0}%
2043 \TestPow{1}{2}{1}%
2044 \TestPow{2}{2}{4}%
2045 \TestPow{3}{2}{9}%
2046 \TestPow{0}{1}{0}%
2047 \TestPow{1}{-2}{1}%
2048 \TestPow{1}{-1}{1}%
2049 \TestPow{-1}{-2}{1}%
2050 \TestPow{-1}{-1}{-1}%
2051 \TestPow{-1}{3}{-1}%
2052 \TestPow{-1}{4}{1}%

```

```

2053 \TestPow{-2}{-1}{0}%
2054 \TestPow{-2}{-2}{0}%
2055 \TestPow{2}{3}{8}%
2056 \TestPow{2}{4}{16}%
2057 \TestPow{2}{5}{32}%
2058 \TestPow{2}{6}{64}%
2059 \TestPow{2}{7}{128}%
2060 \TestPow{2}{8}{256}%
2061 \TestPow{2}{9}{512}%
2062 \TestPow{2}{10}{1024}%
2063 \TestPow{-2}{3}{-8}%
2064 \TestPow{-2}{4}{16}%
2065 \TestPow{-2}{5}{-32}%
2066 \TestPow{-2}{6}{64}%
2067 \TestPow{-2}{7}{-128}%
2068 \TestPow{-2}{8}{256}%
2069 \TestPow{-2}{9}{-512}%
2070 \TestPow{-2}{10}{1024}%
2071 \TestPow{3}{3}{27}%
2072 \TestPow{3}{4}{81}%
2073 \TestPow{3}{5}{243}%
2074 \TestPow{-3}{3}{-27}%
2075 \TestPow{-3}{4}{81}%
2076 \TestPow{-3}{5}{-243}%
2077 \TestPow{2}{30}{1073741824}%
2078 \TestPow{-3}{19}{-1162261467}%
2079 \TestPow{5}{13}{1220703125}%
2080 \TestPow{-7}{11}{-1977326743}%
2081 \end{qstest}
2082
2083 \begin{qstest}{div}{div}
2084 \TestDiv{1}{1}{1}%
2085 \TestDiv{2}{1}{2}%
2086 \TestDiv{-2}{1}{-2}%
2087 \TestDiv{2}{-1}{-2}%
2088 \TestDiv{-2}{-1}{2}%
2089 \TestDiv{15}{2}{7}%
2090 \TestDiv{-16}{2}{-8}%
2091 \TestDiv{1}{2}{0}%
2092 \TestDiv{1}{3}{0}%
2093 \TestDiv{2}{3}{0}%
2094 \TestDiv{-2}{3}{0}%
2095 \TestDiv{2}{-3}{0}%
2096 \TestDiv{-2}{-3}{0}%
2097 \TestDiv{13}{3}{4}%
2098 \TestDiv{-13}{-3}{4}%
2099 \TestDiv{-13}{3}{-4}%
2100 \TestDiv{-6}{5}{-1}%
2101 \TestDiv{-5}{5}{-1}%
2102 \TestDiv{-4}{5}{0}%
2103 \TestDiv{-3}{5}{0}%
2104 \TestDiv{-2}{5}{0}%
2105 \TestDiv{-1}{5}{0}%
2106 \TestDiv{0}{5}{0}%
2107 \TestDiv{1}{5}{0}%
2108 \TestDiv{2}{5}{0}%
2109 \TestDiv{3}{5}{0}%
2110 \TestDiv{4}{5}{0}%
2111 \TestDiv{5}{5}{1}%
2112 \TestDiv{6}{5}{1}%
2113 \TestDiv{-5}{4}{-1}%
2114 \TestDiv{-4}{4}{-1}%

```

```

2115 \TestDiv{-3}{4}{0}%
2116 \TestDiv{-2}{4}{0}%
2117 \TestDiv{-1}{4}{0}%
2118 \TestDiv{0}{4}{0}%
2119 \TestDiv{1}{4}{0}%
2120 \TestDiv{2}{4}{0}%
2121 \TestDiv{3}{4}{0}%
2122 \TestDiv{4}{4}{1}%
2123 \TestDiv{5}{4}{1}%
2124 \TestDiv{12345}{678}{18}%
2125 \TestDiv{32372}{5952}{5}%
2126 \TestDiv{284271294}{18162}{15651}%
2127 \TestDiv{217652429}{12561}{17327}%
2128 \TestDiv{462028434}{5439}{84947}%
2129 \TestDiv{2147483647}{1000}{2147483}%
2130 \TestDiv{2147483647}{-1000}{-2147483}%
2131 \TestDiv{-2147483647}{1000}{-2147483}%
2132 \TestDiv{-2147483647}{-1000}{2147483}%
2133 \end{qstest}
2134
2135 \begin{qstest}{mod}{mod}
2136 \TestMod{-6}{5}{4}%
2137 \TestMod{-5}{5}{0}%
2138 \TestMod{-4}{5}{1}%
2139 \TestMod{-3}{5}{2}%
2140 \TestMod{-2}{5}{3}%
2141 \TestMod{-1}{5}{4}%
2142 \TestMod{0}{5}{0}%
2143 \TestMod{1}{5}{1}%
2144 \TestMod{2}{5}{2}%
2145 \TestMod{3}{5}{3}%
2146 \TestMod{4}{5}{4}%
2147 \TestMod{5}{5}{0}%
2148 \TestMod{6}{5}{1}%
2149 \TestMod{-5}{4}{3}%
2150 \TestMod{-4}{4}{0}%
2151 \TestMod{-3}{4}{1}%
2152 \TestMod{-2}{4}{2}%
2153 \TestMod{-1}{4}{3}%
2154 \TestMod{0}{4}{0}%
2155 \TestMod{1}{4}{1}%
2156 \TestMod{2}{4}{2}%
2157 \TestMod{3}{4}{3}%
2158 \TestMod{4}{4}{0}%
2159 \TestMod{5}{4}{1}%
2160 \TestMod{-6}{-5}{-1}%
2161 \TestMod{-5}{-5}{0}%
2162 \TestMod{-4}{-5}{-4}%
2163 \TestMod{-3}{-5}{-3}%
2164 \TestMod{-2}{-5}{-2}%
2165 \TestMod{-1}{-5}{-1}%
2166 \TestMod{0}{-5}{0}%
2167 \TestMod{1}{-5}{-4}%
2168 \TestMod{2}{-5}{-3}%
2169 \TestMod{3}{-5}{-2}%
2170 \TestMod{4}{-5}{-1}%
2171 \TestMod{5}{-5}{0}%
2172 \TestMod{6}{-5}{-4}%
2173 \TestMod{-5}{-4}{-1}%
2174 \TestMod{-4}{-4}{0}%
2175 \TestMod{-3}{-4}{-3}%
2176 \TestMod{-2}{-4}{-2}%

```

```

2177 \TestMod{-1}{-4}{-1}%
2178 \TestMod{0}{-4}{0}%
2179 \TestMod{1}{-4}{-3}%
2180 \TestMod{2}{-4}{-2}%
2181 \TestMod{3}{-4}{-1}%
2182 \TestMod{4}{-4}{0}%
2183 \TestMod{5}{-4}{-3}%
2184 \TestMod{2147483647}{1000}{647}%
2185 \TestMod{2147483647}{-1000}{-353}%
2186 \TestMod{-2147483647}{1000}{353}%
2187 \TestMod{-2147483647}{-1000}{-647}%
2188 \TestMod{ 0 }{ 4 }{0}%
2189 \TestMod{ 1 }{ 4 }{1}%
2190 \TestMod{ -1 }{ 4 }{3}%
2191 \TestMod{ 0 }{ -4 }{0}%
2192 \TestMod{ 1 }{ -4 }{-3}%
2193 \TestMod{ -1 }{ -4 }{-1}%
2194 <*etex>
2195 \TestMod{1+2}{1+3}{3}%
2196 \TestMod{1-2}{1+3}{3}%
2197 \TestMod{1-2}{1-4}{-1}%
2198 \TestMod{1+2}{1-4}{0}%
2199 \TestMod{1+2}{1-5}{-1}%
2200 </etex>
2201 \end{qstest}
2202 </test2 | test3 | test4>
2203
2204 <*test2 | test3>
2205 \newcommand*{\TestError}[2]{%
2206   \begingroup
2207     \expandafter\def\csname IntCalcError:#1\endcsname{%
2208       \Expect*{#2}{0}%
2209     \expandafter\def\csname IntCalcError:#1\endcsname{ERROR}%
2210     \Expect*{#2}{0ERROR }%
2211   \endgroup
2212 }
2213 \begin{qstest}{error}{error}
2214 \TestError{FacNegative}{\intcalcFac{-1}}%
2215 \TestError{FacNegative}{\intcalcFac{-2147483647}}%
2216 \TestError{FacOverflow}{\intcalcFac{13}}%
2217 \TestError{FacOverflow}{\intcalcFac{2147483647}}%
2218 \TestError{ShlNegativeNumber}{\intcalcShl{-1}}%
2219 \TestError{ShrNegativeNumber}{\intcalcShr{-1}}%
2220 \TestError{DivisionByZero}{\intcalcPow{0}{-1}}%
2221 \TestError{DivisionByZero}{\intcalcDiv{1}{0}}%
2222 \TestError{DivisionByZero}{\intcalcMod{1}{0}}%
2223 \end{qstest}
2224 </test2 | test3>
2225
2226 <*test2 | test3 | test4>
2227 \begin{document}
2228 \end{document}
2229 </test2 | test3 | test4>

```

4 Installation

4.1 Download

Package. This package is available on CTAN¹:

[CTAN:macros/latex/contrib/oberdiek/intcalc.dtx](http://ftp.ctan.org/tex-archive/macros/latex/contrib/oberdiek/intcalc.dtx) The source file.

¹<http://ftp.ctan.org/tex-archive/>

[CTAN:macros/latex/contrib/oberdiek/intcalc.pdf](#) Documentation.

Bundle. All the packages of the bundle ‘oberdiek’ are also available in a TDS compliant ZIP archive. There the packages are already unpacked and the documentation files are generated. The files and directories obey the TDS standard.

[CTAN:macros/latex/contrib/oberdiek/oberdiek-tds.zip](#)

TDS refers to the standard “A Directory Structure for T_EX Files” ([CTAN:tds/tds.pdf](#)). Directories with `texmf` in their name are usually organized this way.

4.2 Bundle installation

Unpacking. Unpack the `oberdiek-tds.zip` in the TDS tree (also known as `texmf` tree) of your choice. Example (linux):

```
unzip oberdiek-tds.zip -d ~/texmf
```

Script installation. Check the directory `TDS:scripts/oberdiek/` for scripts that need further installation steps. Package `attachfile2` comes with the Perl script `pdfatfi.pl` that should be installed in such a way that it can be called as `pdfatfi`. Example (linux):

```
chmod +x scripts/oberdiek/pdfatfi.pl
cp scripts/oberdiek/pdfatfi.pl /usr/local/bin/
```

4.3 Package installation

Unpacking. The `.dtx` file is a self-extracting `docstrip` archive. The files are extracted by running the `.dtx` through plain-T_EX:

```
tex intcalc.dtx
```

TDS. Now the different files must be moved into the different directories in your installation TDS tree (also known as `texmf` tree):

```
intcalc.sty      → tex/generic/oberdiek/intcalc.sty
intcalc.pdf      → doc/latex/oberdiek/intcalc.pdf
intcalc-test1.tex → doc/latex/oberdiek/intcalc-test1.tex
intcalc-test2.tex → doc/latex/oberdiek/intcalc-test2.tex
intcalc-test3.tex → doc/latex/oberdiek/intcalc-test3.tex
intcalc-test4.tex → doc/latex/oberdiek/intcalc-test4.tex
intcalc.dtx      → source/latex/oberdiek/intcalc.dtx
```

If you have a `docstrip.cfg` that configures and enables `docstrip`’s TDS installing feature, then some files can already be in the right place, see the documentation of `docstrip`.

4.4 Refresh file name databases

If your T_EX distribution (teT_EX, miK_TE_X, ...) relies on file name databases, you must refresh these. For example, teT_EX users run `texhash` or `mktextlsr`.

4.5 Some details for the interested

Attached source. The PDF documentation on CTAN also includes the `.dtx` source file. It can be extracted by AcrobatReader 6 or higher. Another option is `pdftk`, e.g. unpack the file into the current directory:

```
pdftk intcalc.pdf unpack_files output .
```

Unpacking with L^AT_EX. The .dtx chooses its action depending on the format:

plain-T_EX: Run docstrip and extract the files.

L^AT_EX: Generate the documentation.

If you insist on using L^AT_EX for docstrip (really, docstrip does not need L^AT_EX), then inform the autodetect routine about your intention:

```
latex \let\install=y\input{intcalc.dtx}
```

Do not forget to quote the argument according to the demands of your shell.

Generating the documentation. You can use both the .dtx or the .drv to generate the documentation. The process can be configured by the configuration file ltxdoc.cfg. For instance, put this line into this file, if you want to have A4 as paper format:

```
\PassOptionsToClass{a4paper}{article}
```

An example follows how to generate the documentation with pdfL^AT_EX:

```
pdflatex intcalc.dtx
makeindex -s gind.ist intcalc.idx
pdflatex intcalc.dtx
makeindex -s gind.ist intcalc.idx
pdflatex intcalc.dtx
```

5 History

[2007/09/09 v1.0]

- First version.

6 Index

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