

Name: \_\_\_\_\_

Part	I	II	III	IV	V	VI	Total
Score							

**Part I: Fill in the blanks.** (6 questions; 3 points for each; 18 points in total.)

Notice: you MUST write the answers in the following tables.

Number	1	2	3
Answer			
Number	4	5	6
Answer			

- The first question  $k > 0$ , text  $f(x) = \ln x - \frac{x}{e} + k$  text  $(0, +\infty)$  text text text text text  
text text text text text text text text text text text text text text text text text  
text text text text text \_\_\_\_\_.
- The second question  $\vec{a} = (2, 1, 2), \vec{b} = (4, -1, 10), \vec{c} = \vec{b} - \lambda \vec{a}$ , text text text  $\vec{a} \perp \vec{c}$ , text  
text text text text text text text text text text text text text  $\lambda =$  \_\_\_\_\_.
- The third question  $\begin{vmatrix} 1 & 2 \\ -3 & x \end{vmatrix} = 0$ , text text text text text text text text text text text  
text text text text text text text  $x =$  \_\_\_\_\_.
- The fourth question  $\alpha_1 = (1, 1, 0), \alpha_2 = (0, 1, 1), \alpha_3 = (1, 0, 1)$ , text  $\beta = (4, 5, 3)$  text  
 $\alpha_1, \alpha_2, \alpha_3$  text text text text text text text text text text text text text text text text  
text text text text text text text text text  $\beta =$  \_\_\_\_\_.
- The fifth question  $\xi$  text text text  $E\xi = 3, D\xi = 2$ , text text text text text text text text text  
text text text text text text text  $E\xi^2 =$  \_\_\_\_\_.
- The sixth question  $\xi$  text text text text  $\eta$  text text text text  $\xi \sim N(1, 4), \eta \sim N(2, 5)$ ,  
text text text text text text text text text text text text text text text text text text  
text text text text text  $\xi - 2\eta \sim$

**Part II: Select one answer from four choices.** (6 questions; 3 points for each; 18 points in total.)

Notice: you MUST write the answers in the following tables.

Number	1	2	3	4	5	6
Answer						

- [illegible]

**Part III: Work out math questions.** (6 questions; 8 points for each; 48 points in total.)

1. The first question  $\int e^{2x} (\tan x + 1)^2 dx$ .

2. The second question  $A(1, 2, -1), B(2, 3, 0), C(3, 3, 2)$  text  $\triangle ABC$  text text text text text.

3. The third question  $A = \begin{vmatrix} 0 & 1 & 2 & 3 \\ 1 & 2 & 3 & 0 \\ 2 & 3 & 0 & 1 \\ 3 & 0 & 1 & 2 \end{vmatrix}$  text.

4. The fourth question, tex text  $f = x_1^2 + 2x_1x_2 - 6x_1x_3 + 2x_2^2 - 12x_2x_3 + 9x_3^2$  text text  
 $f = d_1y_1^2 + d_2y_2^2 + d_3y_3^2$ .

5. The fifth question text text text 0.2 text text, text text 100 text text.

(1) text text text text text text  $\xi$  text 10 text 30 text.

(2) text text text text text text  $\xi$  text 10 text 30 text.

6. The sixth question  $N(\mu, \sigma^2)$  text text 16 text, text text text 3160, text text 100. Text text  $H_0 : \mu = 3140$  text text ( $\alpha = 0.01$ ).

**Part IV: Work out math proofs.** (2 questions; 16 points in total.)

1. (9 points) The first question  $\{x_n\}$  text  $x_1 = \sqrt{2}$ ,  $x_{n+1} = \sqrt{2 + x_n}$ . Text text text, text text text.

2. (7 points) The second question  $A$  text  $B$  text, text  $A$  text  $\bar{B}$  text.

**Appendix** Some data may be used in the exam

$\Phi_0(0.5) = 0.6915$	$\Phi_0(1) = 0.8413$	$\Phi_0(2) = 0.9773$	$\Phi_0(2.5) = 0.9938$
$t_{0.01}(8) = 3.355$	$t_{0.01}(9) = 3.250$	$t_{0.01}(15) = 2.947$	$t_{0.01}(16) = 2.921$
$\chi^2_{0.005}(8) = 22.0$	$\chi^2_{0.005}(9) = 23.6$	$\chi^2_{0.005}(15) = 32.8$	$\chi^2_{0.005}(16) = 34.3$
$\chi^2_{0.995}(8) = 1.34$	$\chi^2_{0.995}(9) = 1.73$	$\chi^2_{0.995}(15) = 4.60$	$\chi^2_{0.995}(16) = 5.14$