

Name: _____

Part	I	II	III	IV	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 text $\beta =$ _____.
- The fifth question ξ 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 ξ text text text text η 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 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						

1. The first question text, text text text text text text text text text text text text
text text text text text text text text text.....()
- (A) first $\int f'(x)\mathrm{d} x=f(x)$ (B) second $\int \mathrm{d} f(x)=f(x)$
- (C) third $\frac{\mathrm{d}}{\mathrm{d} x}\left(\int f(x) \mathrm{d} x\right)=f(x)$ (D) fourth $\mathrm{d}\left(\int f(x) \mathrm{d} x\right)=f(x)$
2. The second question $F(x)$ text $f(x)$ text, text.....()
- (A) first choice $F(x)$ text $\Leftrightarrow f(x)$ text
- (B) second choice $F(x)$ text text $\Leftrightarrow f(x)$ text
- (C) third choice $F(x)$ text $\Leftrightarrow f(x)$ text text
- (D) fourth choice $F(x)$ text text $\Leftrightarrow f(x)$ text text
3. The third question $A=\begin{pmatrix} 1 & 1 & 0 \\ 1 & x & 0 \\ 0 & 0 & 1 \end{pmatrix}$ text text $\lambda_1=1$ text $\lambda_2=2$, text $x=\cdots \cdots$ ()
- (A) 2 (B) 1 (C) 0 (D) -1
4. The fourth question $f=4 x_1^2-2 x_1 x_2+6 x_2^2$ text text text text text text text text text
text text text text text text text text text text text text.....()
- (A) $\begin{pmatrix} 4 & -2 \\ -2 & 6 \end{pmatrix}$ (B) $\begin{pmatrix} 2 & -2 \\ -2 & 3 \end{pmatrix}$ (C) $\begin{pmatrix} 4 & -1 \\ -1 & 6 \end{pmatrix}$ (D) $\begin{pmatrix} 2 & -1 \\ -1 & 3 \end{pmatrix}$
5. The fifth question wrong text.....()
- (A) first choice text text text text text text text text text
- (B) second choice text text text text text text text text text
- (C) third choice text text text text text text text text text
- (D) fourth choice text text text text text text text text text
6. The sixth question X text $\left(X_1,\cdots,X_n\right)$ text wrong text text text text text text text text
text text text text text text text text.....()
- (A) text text text (B) text n text
- (C) X_1,\cdots,X_n text (D) $X_1=X_2=\cdots=X_n$

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 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 ξ text 10 text 30 text.

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

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

Appendix Some data may be used in the exam

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