

| 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 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 $x =$ _____.
- 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 $\xi - 2\eta \sim$ _____.
- 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 text text $\lambda =$ _____.
- 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 text $E\xi^2 =$ _____.
- 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 _____.
- 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 $\beta =$ _____.

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 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.

2. 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
 $f = d_1y_1^2 + d_2y_2^2 + d_3y_3^2$.

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

4. 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.

5. 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 ($\alpha = 0.01$).

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

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

1. (7points) The second question A text B text, text A text \bar{B} text.

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

Appendix Some data may be used in the exam

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