Math 1906 Final Exam 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			

1. 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 $x =$ ____________________.

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 text text $\xi - 2\eta \sim$ ____________________.

3. 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 $\lambda =$ ____________________.

4. 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 $E\xi^2 =$ ____________________.

5. The first question $k > 0$, text $f(x) = \ln x - \frac{x}{\mathrm{e}} + k$ 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 text text ____________________.

6. 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 $\beta =$ ____________________.

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 fourth question $f = 4x_1^2 - 2x_1x_2 + 6x_2^2$ text text text text text text text text text text text text text text text text text text text text text text text text ( )

(A) $\begin{pmatrix} 4 & -1 \\ -1 & 6 \end{pmatrix}$ (B) $\begin{pmatrix} 2 & -1 \\ -1 & 3 \end{pmatrix}$ (C) $\begin{pmatrix} 4 & -2 \\ -2 & 6 \end{pmatrix}$ (D) $\begin{pmatrix} 2 & -2 \\ -2 & 3 \end{pmatrix}$

2. The second question $F(x)$ text $f(x)$ text, text ( )

(A) third choice $F(x)$ text $\Leftrightarrow$ $f(x)$ text text
(B) fourth choice $F(x)$ text text $\Leftrightarrow$ $f(x)$ text text
(C) first choice $F(x)$ text $\Leftrightarrow$ $f(x)$ text
(D) second choice $F(x)$ text text $\Leftrightarrow$ $f(x)$ text

3. 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 text text text ( )

(A) third $\frac{\mathrm{d}}{\mathrm{d}x}\left(\int f(x)\mathrm{d}x\right) = f(x)$ (B) fourth $\mathrm{d}\left(\int f(x)\mathrm{d}x\right) = f(x)$
(C) first $\int f'(x)\mathrm{d}x = f(x)$ (D) second $\int \mathrm{d}f(x) = f(x)$

4. The sixth question X text $(X_1, \cdots, X_n)$ text <u>wrong</u> text text text text text text text text text text text text text text text text ( )

(A) $X_1, \cdots, X_n$ text (B) $X_1 = X_2 = \cdots = X_n$
(C) text text text (D) text n text

5. The fifth question <u>wrong</u> text ( )

(A) third choice text text text text text text text text text
(B) fourth choice text text text text text text text text text
(C) first choice text text text text text text text text text
(D) second choice text text text text text text text text text

6. 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 $x =$ ( )

(A) 0 (B) −1 (C) 2 (D) 1

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 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 $\int \mathrm{e}^{2x}(\tan x + 1)^2 \, \mathrm{d}x$.

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

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

2. (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.

Appendix Some data may be used in the exam

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