

東吳大學 112 學年度暑假轉學生招生考試試題

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| 系級 | 經濟學系三年級 | 考試時間 | 100 分鐘 |
| 科目 | 經濟數學 | 本科總分 | 100 分 |

※一律作答於答案卷上(題上作答不予計分)；並務必標明題號，依序作答。

1. Given $A = \begin{bmatrix} 2 & 0 \\ -1 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 \\ -1 & 0 \end{bmatrix}$, and $C = \begin{bmatrix} 0 & -1 \\ 2 & -1 \end{bmatrix}$; find ABC . (10 points)

2. Find the inverse of matrix $\begin{bmatrix} 0.4 & -0.2 \\ 0.2 & 0.4 \end{bmatrix}$. (10 points)

3. Given $x^3 - xy - y^2 + 1 = 0$. Find the value of $\frac{dy}{dx}$ when $x = 1$. (10 points)

4. Find the first three items of the Taylor series at $x_0 = 2$ for $f(x) = \ln x$. (10 points)

5. Find the eigenvalues of $\begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$. (10 points)

6. Let $z(x, y) = x^2 + y^2 - 4x - 6y + 1$ and $x + y = 10$. Find the stationary values of z , and use the bordered Hessian to determine whether the stationary value is a maximum or a minimum. (20 points)

7. Consider the following problem:

$$\begin{aligned} \min z(x, y) &= 2x^2 - 2xy + y^2 - 10x + 10y \\ \text{s.t. } x^2 + y^2 &\leq 5 \text{ and } 3x - y \leq 6 \end{aligned}$$

List the Kuhn-Tucker conditions and find the optimum (x^*, y^*) . (30 points)