

東吳大學 105 學年度碩士班研究生招生考試試題

第 1 頁，共 1 頁

系級	數學系碩士班 B 組(決策科學與海量資料分析)	考試時間	100 分鐘
科目	基礎數學	本科總分	100 分

- (10 points) Using Lagrange multipliers, find the extrema of the function $11xy + 14yz + 15xz$ under the condition $xyz = 147840$.
- (20 points) Find the area between two parabolas $y = x^2$ and $y = (x - 1)^2$, $0 \leq x \leq 3$.
- (20 points) Find a power series for $f(x) = \frac{\sin x}{x}$ with radius of convergence R , and using the first three terms of this power series to estimate the value of $\int_0^1 \frac{\sin x}{x} dx$.
- (10 points) Let $T : \mathbf{R}^2 \rightarrow \mathbf{R}^3$ be a linear map satisfying $T((-1, 2)) = (-2, 1, 0)$ and $T((3, -5)) = (5, -7, 1)$, find $T((-4, 3))$.
- (20 points) Let $A = \begin{pmatrix} 0 & 0 & -2 \\ 1 & 2 & 1 \\ 1 & 0 & 3 \end{pmatrix}$. Find an invertible matrix S and a diagonal matrix Λ such that $S^{-1}AS = \Lambda$. Apply this formula to compute A^{19} .
- (20 points) Let A, B be 2×2 matrices. Assume that $\det(A) = 2$, $\det(B) = -4$, Find $\det(3A)$, $\det(ABA)$, $\det(A^2B)$, and $\det((AB)^T)$.