東吳大學107學年度碩士班研究生招生考試試題

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

1. (20 points) Find the tangent line of the curve $\sin(x+y)+\cos(x-y)=y$ at the point $(x,y)=(-\frac{\pi}{4},0)$.

2. (20 points) Find the Taylor formula of the function $f(x)=\cos(x^2)$ with respect to $x=0$ up to the 8-th degree, and prove that $|\cos(x^2)-(1-\frac{1}{2}x^4)|\leq\frac{1}{24}$ for all $x\in[-1,1]$.

3. (20 points) Graph the curves of functions $y=x^3+2x^2$ and $y=3x$ on the same xy-coordinate. Find the area bounded by the two curves.

4. (20 points) Consider the matrix

$$A=\begin{pmatrix}0&6&6&3\\1&2&1&1\\4&1&-3&4\\1&3&2&0\end{pmatrix}.$$

Find a basis for the column space, the row space and the null space of A respectively.

5. (20 points) Diagonalize the matrix $A=\begin{pmatrix}5&1\\0&4\end{pmatrix}$.

Compute A^k, k is a natural number.