

國立台灣大學九十四學年度碩士班招生考試試題

科目：應用數學(A)

題號：457

共 / 頁之第 全 頁

1.(10%) Find $\int_0^{\infty} e^{-ax} \cos(bx) dx$, with $a > 0$.

2.(10%) Find $\int_0^{\frac{\pi}{2}} \frac{\sin \theta \cos \theta}{1 + \sin^4 \theta} d\theta$

3.(20%) Solve $\frac{dy}{dx} = xe^{x-y}$ with the boundary condition: $y = \ln 2$ at $x = 0$.

4.(10%) Triangularize the matrix:

$$\begin{bmatrix} -2 & 1 & 0 & 3 \\ 1 & -3 & 2 & 4 \\ 3 & 0 & 2 & -1 \\ 2 & -2 & 4 & 6 \end{bmatrix}$$

5.(10%) Find the eigenvalues and determine the rank of the matrix: $\begin{bmatrix} 1 & 1 \\ a & a^2 \end{bmatrix}$.

6.(20%) Find the Fourier series expansion of the periodic function:

$$f(x) = |x| \text{ for } -\pi < x \leq \pi, \text{ and period} = 2\pi.$$

7.(10%) If we pick 10 telephone numbers at random from a telephone book and record the last digit of the numbers, what is the probability that we obtain each of the integers from 0 to 9 once only?

8.(10%) Find the mean and variance of a continuous random variable distributed uniformly over $[a, b]$ with $a < b$.

試題隨卷繳回