

國立臺灣科技大學

九十學年度碩士班招生考試試題

系所組別：機械工程系甲組、機械工程系乙組、機械工程系丙組、機械工程系丁組、機械工程系戊組
 科目：工程數學

1. Determine the inverse matrix of the following matrix: (20%)

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

2. Find the general solution of the differential equation:
 $x^2 y'' + 6xy' - 6y = 4x + 1$ (20%)

3. Solve the initial value problem by Laplace transform:
 $y'' + 6y' + 8y = e^t$ $y(0) = 0, \quad y'(0) = 2$ (20%)

4. Evaluate a circular integral:

$$\oint \frac{dz}{1+z^3}$$

where the circular is counter clock wise as

$$c: |z+1| = 1. \quad (20\%)$$

5. A laterally insulated bar with length $L=10$ is considered. The initial temperature of the bar is known as

$$u(x,0) = 20 \sin \frac{\pi x}{20},$$

and the heat equation is given as

$$\frac{\partial u}{\partial t} = 4 \nabla^2 u$$

determine the temperature function $u(x,t)$. (20%)



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