淡江大學九十學年度日間部轉學生招生考試試題

系別：工組三年級

科目：工 程 數 學

1. Find the general solution of

$$xy' = \frac{y^2}{x} + y \;. \;(20\%)$$

2. Find the general solution of

$$x^2 y'' + 7xy' + 9y = 27 \ln x \text{ for } x > 0. \;(20\%)$$

3. Find the Laplace transform of the function $f(t)$.

$$f(t) = \begin{cases} 2 & if \ 0 < x < \pi \\ 0 & if \ \pi < x < 2\pi \\ \sin t & if \quad t > 2\pi \end{cases} \quad . \;(20\%)$$

4. Find the eigenvalues and eigenvectors of the matrix A.

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix} . \;(20\%)$$

5. Evaluate the line integral of $\vec{G}(x,y,z) = x\vec{i} - y\vec{j} + z\vec{k}$ over the straight line segment from $(1,1,1)$ to $(-2,1,3)$. (20%)