(7), (11)

國立東華大學招生考試試題

招生學年度	九十七	招生類別	碩士班
系所班別	材料科學與工程學系碩士班、光電工程研究所		
科目	工程數學		
注意事項	可使用掌上型計算機		

(30%) 1. Find the general solution of the following differential equation.

(a) $y' - \frac{1}{x}y = x^2 + 2$

(b) $x^2y'' - 3xy' + 4y = 0$

(15%) 2. $f(t) = -1 + \int_0^t f(t-\alpha)e^{-3\alpha}d\alpha$

Solve for *f(t)*.

(15%) 3. Evaluate $\oint_c Z^{\frac{3}{2}}dz,\ |Z| = a$

(15%) 4. Give a geometric reason why $(\vec{F}\times\vec{G})\times(\vec{H}\times\vec{K})$ **should be in the plane determined by** $\vec{F}$ **and** $\vec{G}$**, assuming that** $\vec{F}$ **and** $\vec{G}$ **are not parallel.**

(15%) 5. Use vectors to show that the distance in R^3 between a point (x_0, y_0, z_0) and a plane $ax + by + cz + d = 0$ **is** $|ax_0 + by_0 + cz_0 + d| / \sqrt{a^2 + b^2 + c^2}$**, assuming that *a*, *b*, and *c* are not all zero.**

(10%) 6. Is the following matrix orthogonal? Why?

$$\begin{bmatrix} 1/\sqrt{3} & -\sqrt{\frac{2}{3}} & 0 \\ 1/\sqrt{3} & 1/\sqrt{6} & -1/\sqrt{2} \\ 1/\sqrt{3} & 1/\sqrt{6} & 1/\sqrt{2} \end{bmatrix}$$