

臺灣綜合大學系統 105 學年度學士班轉學生聯合招生考試試題

科目名稱	工程數學	類組代碼	D09
		科目碼	D0992
※本項考試依簡章規定各考科均「不可以」使用計算機			本試題共計 1 頁

1. (40%) Solve the following initial value problems.

(a) (10%) $xy' = y + 1, \quad y(1) = 2.$

(b) (10%) $y' + y = e^{-x}, \quad y(0) = 1.$

(c) (10%) $(x + y)dx + (x - y^3)dy = 0, \quad y(0) = \sqrt{2}.$

(d) (10%) $y'' + 3y' + 3.25y = \sin t, \quad y(0) = 0, \quad y'(0) = 1.$

2. (20%) Use Laplace transform to solve the initial value problem.

$$4y'' + 5y' + 2y = 3\delta(t) - 3\delta(t-1), \quad y(0) = y'(0) = 0.$$

3. (10%) Find the first four terms of a power series solution

$$y'' + xy' - xy = x.$$

4. (10%) Find the eigenvalues and associated eigenvectors of matrix

$$A = \begin{bmatrix} 4 & -2 \\ -2 & 2 \end{bmatrix}$$

5. (20%) Use Green's theorem to evaluate $\oint_C \mathbf{F} \cdot d\mathbf{r}$, where $\mathbf{F} = (x + y)\mathbf{i} + (x - y)\mathbf{j}$ and C

is the ellipse $x^2 + 9y^2 = 9$.