

科目	工程數學(僅考微分方程)	適用 系別	織復系三年級	時間	80分鐘
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※ 請務必在答案卷作答區內作答 ※

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1. Find the general solution of the following first-order differential equations:

(a)  $y' = x\sqrt{1-y^2}$  (10%)

(b)  $y' = (x+y)^2$  (10%)

(c)  $xy' + y = y^2$  (10%)

2. Solve the initial value problem:

$$2\sin(y^2)dx + xy\cos(y^2)dy = 0 \quad y(2) = \sqrt{\frac{\pi}{2}} \quad (20\%)$$

3. In a survey, the ratio of the number of adults who preferred tea to those who preferred coffee was 7:4. Among them, 69 more people preferred tea to coffee. How many people were in the survey?  
(10%)4. (A) Solve  $y'' = -10$ ,  $y(0) = 0$ ,  $y'(0) = 10$  (20%)(B) Find the maximum of  $y$ (C) Find the maximum of  $y'$ (D) Draw  $y(x)$ 

5. Solve (20%)

$$\begin{cases} y_1'' = 5y_1 + 3y_2 \\ y_2'' = 3y_1 + 5y_2 \end{cases}$$