注意事項：

1、本科目得使用本校提供之電子計算器。

2、請於答案卷上規定之範圍作答，違者該題不予計分。

1. (a) Find a general form for the solution of y

$$y' + P(x)y = Q(x)$$
(10%)

(b) If $P(x) = -2x, Q(x) = x$, find a complete solution of y
(5%)

2. Consider one parameter family of curves

$$x^2 + 2xy - y^2 + 4x - 4y = c$$

where c is the parameter. Find the equation for orthogonal trajectories of this family.
(15%)

3. Find the general solution of the following equation:

$$xdy - [y + xy^3(1 + \ln x)]dx = 0$$
(15%)

4. Find the general solution of

$$y^{(4)} + 11y^{(3)} + 36y'' + 16y' - 64y = -3e^{-4x} + 2\cos(2x)$$
(15%)

5. Find the general solution of

$$xy'' + (x + 2)y' + y = 0$$
(15%)

6. Solve the initial value problem by Laplace transform

$$y'' + y = f(x), \quad y(0) = 1, \, y'(0) = 0$$

Where $f(x) = \begin{cases} 1, & 0 < x \le \pi/2 \\ \sin x, & x > \pi/2 \end{cases}$
(15%)

7. Find the general solution of

$$y'' - 3y' + 2y = x^2$$
(10%)