1. Solve the given non-homogeneous differential equation, y is a function of x.

   $y'' - 16y = 2e^{4x}$　　　　　　　　　　　15%

2. Solve the given initial-value problem, y is a function of x.

   $2y'' + 3y' - 2y = 14x^2 - 4x - 11;$　　$y(0) = 0,\ y'(0) = 0$　　　15%

3. Use Gaussian elimination or Gauss-Gordan elimination to solve the given system of equations.

   $x_1 + 2x_2 + 2x_3 = 2$
   $x_1 + x_2 + x_3 = 0$　　　　　　　　　15%
   $x_1 - 3x_2 - x_3 = 0$

4. Use the Laplace transform to solve the given differential equation subject to the indicated initial conditions, y is a function of t.

   $y'' - 6y' + 9y = t;$　　$y(0) = 0,\ y'(0) = 1$　　　　　15%

5. Find the eigenvalues and eigenvectors of $A = \begin{bmatrix} 5 & -1 & 0 \\ 0 & -5 & 9 \\ 5 & -1 & 0 \end{bmatrix}$　　20%

6. Write a general expression of a Fourier series and explain the functions and applications of Fourier series (就你所知解釋 Fourier series 的功能及應用). 20%