

1. Solve

$$\sin(y-x)dx + [\cos(y-x) - \sin(y-x)]dy = 0$$

2. Solve

$$x^2 y'' - xy' - 24y = 0, \quad y(1) = 15, \quad y'(1) = 0$$

3. Solve

$$y_1'' = 4y_2 - 4e^t$$

$$y_2'' = 3y_1 + y_2$$

$$y_1(0) = 1, \quad y_1'(0) = 2,$$

$$y_2(0) = 2, \quad y_2'(0) = 3$$

4. Find  $\text{curl } \bar{v}$

$$\bar{v} = (x^2 + y^2 + z^2)^{-\frac{3}{2}}[x, y, z]$$

5. Find the Fourier series of the function  $f(x)$

$$f(x) = 1 - x^2 \quad (-1 < x < 1), \quad p = 2$$