1. Chapter 4:

   a. Solve the IVP: $y'' + 6y' + 3y = 0;$ $y(0) = 1$ $y'(0) = 0$

   b. Solve the ODE using the method of undetermined coefficients:
      $y'' - 2y' - 3y = -3te^{-t}$

   c. Solve the ODE using variation of parameters:
      $y'' + 4y' + 4y = t^{-2}e^{-2t}$

2. Chapter 5:

   a. Solve the IVP using the method of Laplace Transforms:
      $y'' - 2y' + 2y = \cos t;$ $y(0) = 1,$ $y'(0) = 0$

   b. Find the Laplace transform of:
      $$f(t) = \begin{cases} t^2 & 0 \le t < 2 \\ 2 & 2 \le t < 6 \\ \cos t & 6 \le t < 10 \\ 0 & \text{otherwise} \end{cases}$$

   c. Find the inverse Laplace transform:
      $$F(s) = \frac{e^{-s} + e^{-2s} - e^{-3s} - e^{-4s}}{s}$$

   d. Find the inverse Laplace transform:
      $$F(s) = \frac{se^{-s}}{s^2 - 2s + 10}$$