1. For \( t > 0 \), consider the mass spring system

\[ x'' + \mu x' + kx = 0. \tag{1} \]

(a) 2 Let \( x(t) \) be a solution to this system with graph below.

i. Is the system (1) Overdamped, Underdamped, or Undamped.

ii. Which of the following may be solutions to this system?
   - \( x(t) = 3e^{-t} \cos 4t \)
   - \( x(t) = -4 \sin t + 3 \cos t \)
   - \( x(t) = 4e^{-3t} - 3e^{-2t} \)

(b) 2 Let \( x(t) \) be a solution to this system with graph below.

i. Is the system (1) Overdamped, Underdamped, or Undamped.

ii. Which of the following may be solutions to this system?
   - \( x(t) = 3e^{-t} \cos 4t \)
   - \( x(t) = -4 \sin t + 3 \cos t \)
   - \( x(t) = 4e^{-3t} - 3e^{-2t} \)

(c) 2 Let \( x(t) \) be a solution to this system with graph below.

i. Is the system (1) Overdamped, Underdamped, or Undamped.

ii. Which of the following may be solutions to this system?
   - \( x(t) = 3e^{-t} \cos 4t \)
   - \( x(t) = -4 \sin t + 3 \cos t \)
   - \( x(t) = 4e^{-3t} - 3e^{-2t} \)

2. 4 Find the solution to the initial value problem

\[ y'' + y = 10e^{2t}, \quad y(0) = 5, \quad y'(0) = 1. \]