Introduction to Differential Equations

College of the Atlantic. January 5, 2025

1. Consider the equation:

$$x^3 - 4x^2 + 6x - 24 = 0 \ . \tag{1}$$

   Which, if any, are solutions of Eq. (1)?

   (a) $x = 3$

   (b) $x = 4$

   (c) $x = \sqrt{6}i$

2. Consider the differential equation:

$$\frac{dy}{dt} = -3y + 6t + 11 \ . \tag{2}$$

   Which, if any, are solutions of Eq. (2)?

   (a) $y(x) = e^{-3t}$

   (b) $y(x) = e^{-3t} + 2t + 3$

3. Consider the differential equation:

$$\frac{dP}{dt} = 0.2P \ , \tag{3}$$

   (a) In words, what does this equation say? What situation might this equation apply to?

   (b) If the initial P is 50, what will happen to P as time progresses? Why?

   (c) Without doing any calculus or algebra, sketch a solution to Eq. (3).