Applied Mathematics I
Worksheet #1 Answers

1. x = Jack's age, y = Jill's age.

$$\begin{aligned} x &= 4 + 2y \\ y &= 2x - 2 \end{aligned}$$

linear, algebraic system of equations

2. P(t) = population at time t:

   ® = growth rate=natural birth rate -natural death rate.

   ¯ = harvest rate in population units per unit time.

   P_0 = initial population.

$$P'(t) = \mathrm{®}P(t) - \mathrm{¯}; \; P(0) = P_0:$$

   linear,di¤erential scalar equation

3. w = market share for Widgets Inc. expressed as a percent.

   g = market share for Gadgets Galore expressed as a percent.

$$\begin{aligned} w + g &= 100 \\ w &= 0{:}9w + 0{:}8g \\ g &= 0{:}1w + 0{:}2g \end{aligned}$$

   linear, algebraic system of equations

4. Let (x; y) be the coordinates of the ship measured from the reference point (x east, y north) . Then

$$\begin{aligned} (x + 2{:}4)^2 + (y - 5{:}2)^2 &= 4{:}5^2; \\ (x - 3{:}8)^2 + (y - 8{:}3)^2 &= 2{:}9^2; \\ (x - 3{:}6)^2 + (y - 4{:}5)^2 &= 2{:}2^2: \end{aligned}$$