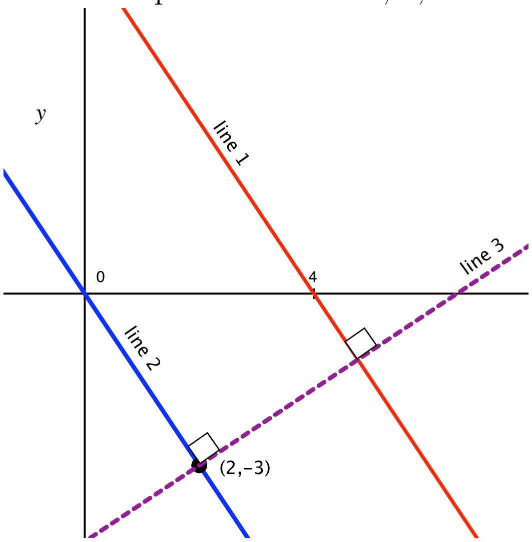
Math 111 Worksheet #2 Solutions

1. Find the equation of lines 1, 2, and 3. (Line 3 is perpendicular to lines 1 and 2.)



Note that line 2 goes through the points (0,0) and $(2,-3)$, so it has

$$\text{slope} = \frac{-3-0}{2-0} = -\frac{3}{2}.$$

Since line 2 has y-intercept (0,0), the equation for the line is $y = -\frac{3}{2}x$.

Line 1 is parallel to line 2 and goes through the point $(4,0)$. Using the point-slope form of the line we have $y - 0 = -\frac{3}{2}(x-4) \quad \Rightarrow \quad y = -\frac{3}{2}x + 6$.

Line 3 is perpendicular to line 1 and 2, so it has slope $= \frac{2}{3}$ and it goes through the point $(2,-3)$. Using the point-slope form of the line we have $y - (-3) = \frac{2}{3}(x-2)$

$$\Rightarrow \quad y = \frac{2}{3}x - \frac{13}{3}.$$

2. $h(x) = \dfrac{1}{\sqrt{9x+7}}$

   (a) Solve $h(x) = \frac{1}{4}$.

   We are solving for x such that $\dfrac{1}{\sqrt{9x+7}} = \dfrac{1}{4} \quad \Rightarrow \quad \sqrt{9x+7} = 4$

   $$\Rightarrow \quad 9x + 7 = 16$$
   $$\Rightarrow \quad x = 1$$

   (b) What is the vertical intercept of the graph of $h(x)$?

   To find the vertical intercept, we must evaluate $h(x)$ at $x = 0$.

   $$h(0) = \frac{1}{\sqrt{9(0)+7}} = \frac{1}{\sqrt{7}}$$

So, the vertical intercept is $(0, \frac{1}{\sqrt{7}})$.

(c) Find $h(2)$.

Evaluating $h(x)$ at $x = 2$: $\quad h(2) = \dfrac{1}{\sqrt{9(2)+7}} = \dfrac{1}{\sqrt{25}} = \dfrac{1}{5}$

3. The distance travelled (in inches) by a turtle at time t (in seconds) is given by the function $d(t) = 2t^{1/4}$.

(a) How far is the turtle after 16 seconds?

The distance will be given by evaluating the function $d(t)$ at $t = 16$.

$$\text{Distance} = d(16) = 2(16)^{1/4} = 2\sqrt[4]{16} = 2(2) = 4$$

So, the distance is 4 inches after 16 seconds.

(b) When will the turtle have travelled 20 inches? Give your answer to the nearest minute.

To solve for time t, we will have to solve the equation $d(t) = 20$.

$$2t^{1/4} = 20 \quad \Rightarrow \quad t^{1/4} = 10$$
$$\Rightarrow \quad t = 10^4 = 10000 \text{ seconds}$$

So, it will take the turtle 10000 seconds or $\frac{10000}{60} \approx 167$ minutes.