Math 124 C1 Homework #6
Ch. 1.2 #1, 2, 4, 10, 14, 22, 42
Ch. 1.3 #10, 14, 16, 18

Chapter 1.2

#1.

a. Linear.

b. Not linear – the $4xy$ is not allowed.

c. Linear.

d. Not linear – the x^2 and y^2 are not allowed.

#2.

a. Not linear – the x^2 and y^2 are not allowed.

b. Linear.

c. Linear.

d. Not linear – the xy term is not allowed.

#4.

a. Yes.

b. Yes.

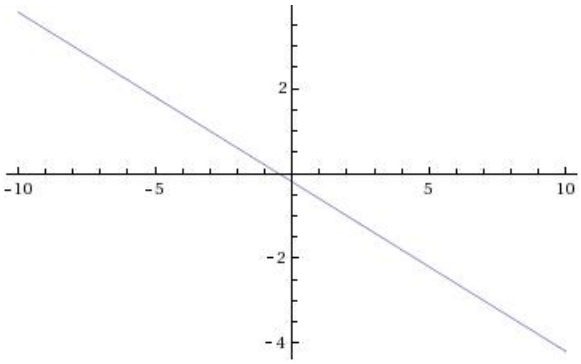
c. No.

d. No.

e. Yes.

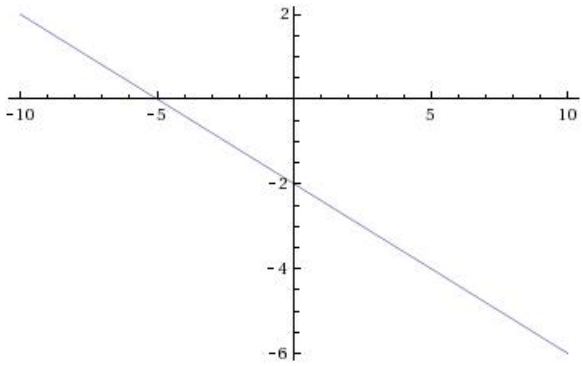
#10.a.

The slope is equal to $m = \frac{(-3)-1}{7-(-3)} = \frac{-4}{10} = -\frac{2}{5}$.



#10.b.

The slope is equal to $m = \frac{(-4)-0}{5-(-5)} = \frac{-4}{10} = \frac{-2}{5}$.



#14

We use point-slope form with $(x_1, y_1) = (-3, 5)$ and $m = -\frac{3}{7}$: $y - 5 = -\frac{3}{7}(x + 3)$.

#22

We can determine whether three points lie on the same line by finding the equation of the line through two of the points, then checking whether the third point lies on that line.

Using the first two points given, $(3, -2)$ and $(1, 1)$, the equation of our line is $y+2 = \frac{1-(-2)}{1-3}(x-3)$, which simplifies to $y + 2 = -\frac{3}{2}(x - 3)$.

We now plug in the point $(-1, 4)$ and verify whether the equation of our line is true here.

$4 + 2 = 6 \stackrel{?}{=} -\frac{3}{2}(-1 - 3) = -\frac{3}{2}(-4) = 6$

Since the equation holds, $(-1, 4)$ is on our line.

#42

First, we find the slope of the line given, $-7x + 2y = 3$. We do this by putting the line into slope-intercept form:

$$\begin{aligned} -7x + 2y &= 3 \\ 2y &= 7x + 3 \\ y &= \frac{7}{2}x + \frac{3}{2} \end{aligned}$$

Thus our slope is $\frac{7}{2}$; a line parallel to this one will also have slope $\frac{7}{2}$, and a line perpendicular to this one will have slope $-\frac{2}{7}$.

Therefore, the line parallel to the given line but through point $(1, -2)$ is $y + 2 = \frac{7}{2}(x - 1)$, and the line perpendicular to the given line through $(5, 3)$ is $y - 3 = -\frac{2}{7}(x - 5)$.

Chapter 1.3

#10.

$$\begin{aligned} 5x + y &= 17 \\ -10x - 2y &= -34 \end{aligned}$$

Multiply equation 1 by 2 and add the two equations:

$$\begin{aligned} 10x + 2y &= 34 \\ -10x - 2y &= -34 \\ \hline 0x + 0y &= 0 \end{aligned}$$

Therefore, these two lines are actually the same, and any point satisfying the first equation satisfies the second as well. Therefore the solutions are all the points satisfying $5x + y = 17$.

#14

We start by multiplying the second equation by two and adding them together.

$$\begin{aligned} 3x - 4y &= 1 \\ 2x + 4y &= -6 \\ \hline 5x &= -5 \end{aligned}$$

If $5x = -5$, $x = -1$. We then plug x=-1 into the first equation and solve for y.

$$\begin{aligned} 3(-1) - 4y &= 1 \\ -3 - 4y &= 1 \\ -4y &= 4 \\ y &= -1 \end{aligned}$$

Thus there is one solution to this system, $x = -1$ and $y = -1$.

#16.

We multiply the first equation by 2 and add them together.

$$\begin{aligned} 8x - 6y &= 10 \\ -8x + 6y &= -10 \\ \hline 0x + 0y &= 0 \end{aligned}$$

Again, we see that the two equations describe the same line, so the solution set consists of all points (x, y) satisfying $4x - 3y = 5$.

#18.

Again, we multiply the first equation by 2 and add the equations together.

$$\begin{aligned} -4x - 6y &= 4 \\ 4x + 6y &= 1 \\ - - - - - - - - - - & \\ 0x + 0y &= 5 \end{aligned}$$

Since $0x + 0y = 0$, we are left with the equation $0 = 5$, which is not true. Therefore, there can be no values of x and y satisfying both of these equations at once. This system is inconsistent and has no solutions.