Math 1030, Homework Activity #1, Summer 2014 Name KEY
Sections 3.5, 3.6

Instructions: Complete the following problems. You may work alone or in a group. Do not just copy answers from a group member, but be sure that you understand the problem. Similar questions will appear on exams. You may be asked to explain or present the answers to the class. This assignment is due at the end of the class period.

The Point-Slope form of the line is: $y - y_1 = m(x - x_1)$ using the slope m, and the point (x_1, y_1).

1. Find the equation of the line with a slope of 3 and passing through the point (2,5).

$y-5 = 3(x-2) \Rightarrow y-5 = 3x-6 \Rightarrow y = 3x-1$ (m=3; +5 to both sides)

2. Find the equation of the line passing through the point (-3,-11) and (2,-1).

$m = \frac{-1-(-11)}{2-(-3)} = \frac{-1+11}{2+3} = \frac{10}{5} = 2$

$y-(-1) = 2(x-2)$

$y+1 = 2x-4 \Rightarrow y = 2x-5$ (−1 to both sides)

3. Nationwide, the statistics for traffic fatalities show a decline. In 1999, the United States had 41,717 fatal crashes, and in 2009, the number dropped to 33,808. Find an equation of the line that models the fatal crash rate with x as the number of years, and y as the number of fatal crashes.

(1999, 41717) (2009, 33808)

$\frac{33808-41717}{2009-1999} = \frac{-7909}{10} = -790.9$

$y-33808 = -790.9(x-2009)$

$y-33808 = -790.9x + 1588918.1$ (+33808)

$y = -790.9x + 1,622,726.1$

Redo the equation of the line using x as the number of years since 1999.

(0, 41717) (10, 33808)

$\frac{33808-41717}{10-0} = \frac{-7909}{10} = -790.9$

$y-41717 = -790.9(x-0) \Rightarrow y = -790.9x + 41,717$

In what year does this equation predict there will be no fatal crashes?

year 53.

2052

$0 = -790.9x + 41,717$

$\frac{790.9x}{790.9} = \frac{41717}{790.9}$

$x = 52.746$

(we don't # years w/ decimals & round up)

4. Determine if the following sets of lines are parallel, perpendicular or neither.

a. $L_1: y = 2x - 3$
$L_2: y = -\frac{1}{2}x + 1$ perpendicular $2(-\frac{1}{2}) = -1$

b. $L_1: x - 4y = 24 \Rightarrow -4y = -x + 24 \Rightarrow y = \frac{1}{4}x - 6$
$L_2: 2x - 8y = -8 \Rightarrow -8y = -2x - 8 \Rightarrow y = \frac{1}{4}x + 1$
parallel $\frac{1}{4} = \frac{1}{4}$

c. $L_1: 2x - 5y - 45 = 0 \Rightarrow -5y = -2x + 45 \Rightarrow y = \frac{2}{5}x - 9$
$L_2: 5x + 2y - 8 = 0 \Rightarrow 2y = -5x + 8 \Rightarrow y = -\frac{5}{2}x + 4$
$\frac{2}{5}(-\frac{5}{2}) = -1$ perpendicular

d. $L_1: y = -4x + 3$
$L_2: y = 4x - 1$ neither

e. $L_1: (0,-1), (-2,-7)$ $m = \frac{-7-(-1)}{-2-0} = \frac{-7+1}{-2} = \frac{-6}{-2} = 3$
$L_2: (-1,5), (2,-4)$ $m = \frac{-4-5}{2-(-1)} = \frac{-9}{2+1} = -\frac{9}{3} = -3$ neither

f. $L_1: (2,8), (7,18)$ $m = \frac{18-8}{7-2} = \frac{10}{5} = 2$
$L_2: (-2-3), (6,13)$ $m = \frac{13-(-3)}{6-(-2)} = \frac{13+3}{6+2} = \frac{16}{8} = 2$ parallel

g. $L_1: (-6,-9), (3,6)$ $m = \frac{6-(-9)}{3-(-6)} = \frac{6+9}{3+6} = \frac{15}{9} = \frac{5}{3}$
$L_2: (10,-8), (-5,1)$ $m = \frac{1-(-8)}{-5-10} = \frac{9}{-15} = -\frac{3}{5}$ perpendicular

5. Find the equation of the line parallel to the y-axis and passing through the point (3,-6).

y-axis is vertical

$x = 3$

6. Find the equation of the line perpendicular to $y = -2x + 5$ and passing through the point (-2,3)

$m = -2$ neg reciprocal $= \frac{1}{2}$

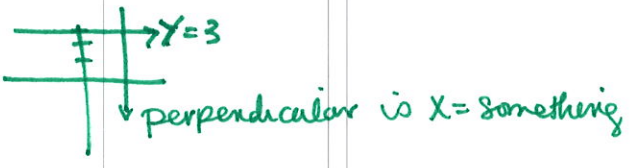
$y - 3 = \frac{1}{2}(x - (-2)) \Rightarrow y - 3 = \frac{1}{2}(x + 2) \Rightarrow y - 3 = \frac{1}{2}x + 1$
$+3 \qquad +3$
$\Rightarrow y = \frac{1}{2}x + 4$

7. Find the equation of the line parallel to $6x - 2y = 1$ and passing through (-3,-2).

$-6x \qquad -6x$
$\frac{-2y}{-2} = \frac{-6x}{-2} + \frac{1}{-2} \Rightarrow y = 3x - \frac{1}{2}$
$m = 3$ keep for parallel

$y - (-2) = 3(x - (-3)) = y + 2 = 3(x + 3) \Rightarrow y + 2 = 3x + 9 \Rightarrow y = 3x + 7$
$-2 \qquad -2$

8. Find the equation of the line perpendicular to the line y=3 and passing through (4,-5).



$x = 4$