Math 113 – Linear Functions Practice Test

(1) Define the x and y intercepts of the line $6x+3y=18$

x	y
3	0
0	6

x- intercept: $(3,0)$ y-intercept: $(0,6)$

$6x+3(0)=18$

$6x=18$

$x=3$

$6(0)+3y=18$

$3y=18$

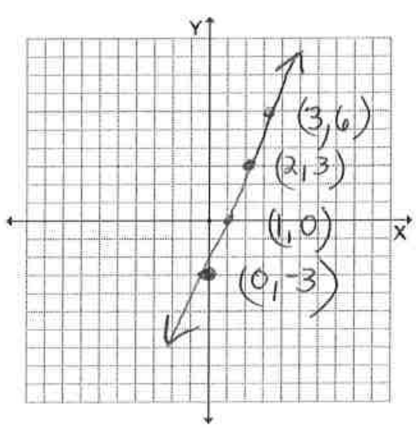
$y=6$

(2) Complete the table of values for the line

$4x+3y=36$

x	y
0	12
9	0
6	4
12	-4

(3) Graph the line that contains the point (2,3) and has a slope of 3.



Label Your Points!!!

(4) Find the slope of the line containing the points (1,1) and (3,8)

$m = \frac{8-1}{3-1} = \frac{7}{2}$

$m =$ $\frac{7}{2}$

(5) Find the equation of the line **(in Slope-Intercept Form)** containing the point (2,5) and a slope $= -1$

$y = -x + 7$

$5 = -1(2) + b$
$5 = -2 + b$
$7 = b$

(6) Find the slope of the line $4x - 2y = 5$.

$m = 2$

$-2y = -4x + 5$
$y = 2x - \frac{5}{2}$

(7) Find the equation of the line **(in Standard Form)** that contains the points (3,5) and (7,1)

$m = \frac{1-5}{7-3} = \frac{-4}{4} = -1$

$x + y = 8$

$5 = -1(3) + b$
$5 = -3 + b$
$8 = b$

$y = -x + 8$
$x + y = 8$

(8) Find the equation of the line that is perpendicular to the line $3x + y = 3$ and contains the point (6,10).

$y = \frac{1}{3}x + 8$

$y = -3x + 3$
original slope $= -3$

new slope $= \frac{1}{3}$

$10 = \frac{1}{3}(6) + b$
$10 = 2 + b$
$8 = b$

(9) Find the equation of the line that is parallel to the line $5x-3y=15$ and contains the point (6,9).

$y = \frac{5}{3}x - 1$

$5x - 3y = 15$

$-3y = -5x + 15$

$y = \frac{5}{3}x - 5$

original slope

new slope $= \frac{5}{3}$

$9 = \frac{5}{3}(6) + b$

$9 = 10 + b$

$-1 = b$

(10) Find the equation of the line that is perpendicular to the line $x = 4$ and goes through the point (3,2).

horizontal line

$y = 2$

(11) Find the equation of a line that goes through the point (6,7) and has a slope of 0.

horizontal line

$y = 7$

(12) In 2002, the cost of a Honda Pilot was \$28,500. In 2005, the cost of a Honda Pilot was \$32,400. Let t = the number of years since 2000. Assuming that the relationship between time and cost is linear, determine a formula for predicting the cost of a Honda Pilot. Use this formula to predict the cost of a Honda Pilot in 2011.

(2, 28500)

(5, 32400)

$m = \frac{32400 - 28500}{5 - 2} = \frac{3900}{3} = 1300$

$28500 = 1300(2) + b$

$28500 = 2600 + b$

$25,900 = b$

$\boxed{y = 1300t + 25,900}$

$y = 1300(11) + 25900$

$= 14300 + 25900$

$= \$40,200$

(13) A plant can manufacture 120 lamps for a total daily cost of \$7,140 and 250 lamps for \$8,700.

a. If the total daily cost of producing lamps is linearly related to the number of lamps produced, determine the cost function for total daily costs for x lamps.

(120, 7140)
(250, 8700)

$$m = \frac{8700 - 7140}{250 - 120} = \frac{1560}{130} = 12$$

$c(x) = 12x + 5700$

$7140 = 12(120) + b$
$7140 = 1440 + b$
$5700 = b$

b. What would be the cost of producing 350 lamps?

$12(350) + 5700 =$

\$9900

c. If the selling price of these lamps is \$50 per lamp, what is the revenue function for the lamps?

$R(x) = 50x$

d. What is the break-even point for these lamps?

$R(x) = c(x)$
$50x = 12x + 5700$
$38x = 5700$
$x = 150$

150 lamps
cost \$7500

e. What is the profit function for these lamps?

$P(x) = R(x) - c(x)$
$= 50x - [12x + 5700]$
$P(x) = 38x - 5700$

$P(x) = 38x - 5700$

f. What profit would be made by selling 225 lamps?

$38(225) - 5700 =$

\$2850

(14) If a product has a selling price of \$110, consumers are willing to buy 200 units of it. If the price is \$70, they will buy 400 units. A manufacturer will produce 150 units of the product if the selling price is \$60 or 250 units if the selling price is \$120.

a. Find the demand function. $p = D(q) = -\frac{1}{5}q + 150$

$(200, 110)$
$(400, 70)$

$m = \frac{70-110}{400-200} = \frac{-40}{200} = \frac{-1}{5}$

$110 = -\frac{1}{5}(200) + b$
$110 = -40 + b$
$150 = b$

b. Find the supply function. $p = S(q) = \frac{3}{5}q - 30$

$(150, 60)$
$(250, 120)$

$m = \frac{120-60}{250-150} = \frac{60}{100} = \frac{3}{5}$

$60 = \frac{3}{5}(150) + b$
$60 = 90 + b$
$-30 = b$

c. If the price of the product were \$150, how many units would manufacturers produce? 300 units

$150 = \frac{3}{5}q - 30$
$\frac{5}{3} \cdot 180 = \frac{5}{3} \cdot \frac{3}{5}q$
$300 = q$

d. What is the market equilibrium (both price and quantity)? $(225, \$105)$

$-\frac{1}{5}q + 150 = \frac{3}{5}q - 30$
$150 = \frac{4}{5}q - 30$
$\frac{5}{4} \cdot 180 = \frac{4}{5}q \cdot \frac{5}{4}$
$225 = q$

$p = \frac{3}{5}(225) - 30$
$p = 105$

-or-

$p = -\frac{1}{5}(225) + 150$
$p = 105$

Bonus:

Graph the Cost Function and Revenue Function from Problem #13.