Name: _____ Date: _____ /50

Math 110

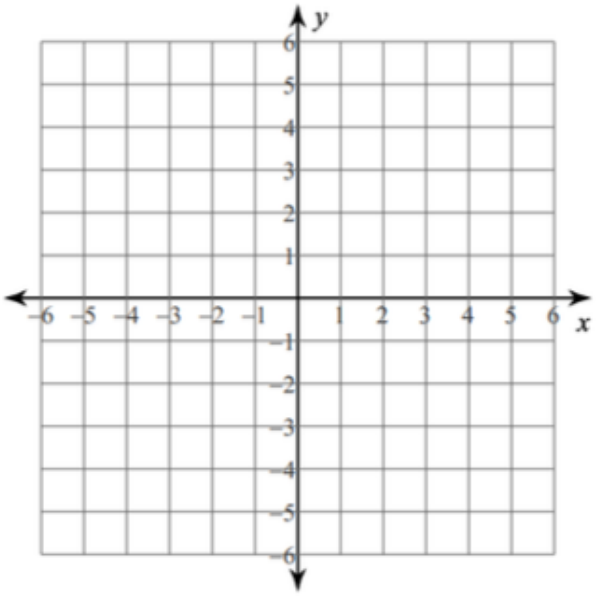
**Quiz 1 – Linear Functions**

Show all work for full credit.

1. **(5 pts)** Given $-4x + 5y = 10$
   a. Find the $x$-intercept

   b. Find the $y$-intercept

   c. Graph the line




2. **(6 pts)** A machine is now worth \$120,000 and will be depreciated linearly over an 8-year period, at which time it will be worth \$25,000 as scrap.
   a. Find the depreciation function that gives the value of the machine in year $x$.

   b. What will the machine be worth in 3 years?

   c. When will the machine be worth half its original value?

3. **(16 pts)** Ink cartridges are produced with a fixed monthly cost of $18,000 and variable costs of $12 per ink cartridge produced. The ink cartridges sell for $28 each.

   a. Find the cost function

   b. Find the revenue function

   c. Find the break-even point

   d. Graph and label the cost and revenue functions on the same set of axes. Label the break-even point.

   e. At a production level of 800 ink cartridges, is the company making money or losing money? Explain why.

   f. Find the profit function

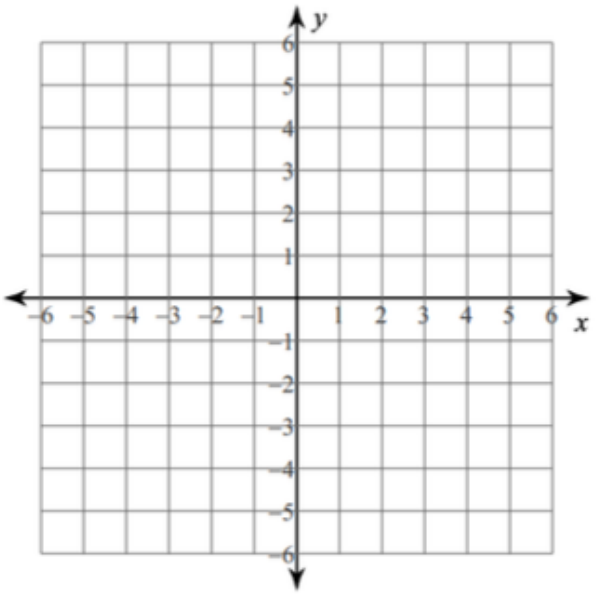
   g. How much profit will they make by producing and selling 2000 ink cartridges?

   h. How many ink cartridges must be produced and sold in order to obtain a profit of $100,000?

4. **(4 pts)** Find the slope of the line through each pair of points:
   a. $(11, -3)$ and $(5,6)$
   b. $(-3,8)$ and $(-3,2)$

5. **(3 pts)** Given $5x - 4y = 8$
   a. Rewrite in slope-intercept form

   b. Graph the line



6. **(16 pts)** A fashion company can sell 150 shirts at a price of $35 each. If the price drops to $20 apiece, the company can sell 300 shirts. The company's suppliers are willing to supply only 130 shirts if the price per shirt is $25. However, if the price per shirt increases to $40 per shirt, the suppliers are willing to provide 430 shirts.

   a. Write the demand function

   b. Write the supply function

   c. Find the equilibrium point. For supply to equal demand, the shirts must be priced at how much apiece?

   d. Graph both the demand and supply function on the same axis. Label both lines.

   e. At $q = 100$, will the company have a surplus or a shortage of shirts? Explain why.