Sept. 10 Worksheet

1. What are the x and y intercepts of the following equations? What are the slopes?

   - $y = (1/2)x + 3$

   - $y = 9x - 7$

   - $y = -7x^2$

2. A piece of heavy machinery is purchased for $150,000. After five years, its value is estimated to be $80,000. Assuming the equipment's value depreciates linearly:

   What is the annual depreciation of this function?

   How long will it be until the equipment is worth $20,000?

3. A leisure boat is purchased for $90,000, and after five years, it is now worth $65,000. Assuming the boat's value depreciates linearly:

   Find the linear depreciation equation.

   How much will the boat be worth after 12 years?

4. A small bakery makes custom cakes. Each cake costs $12 to produce. The total cost to produce 80 cakes is $1,360.

What is the cost function equation?

Using this information, what are the fixed costs?

5. From question 4, find the average cost to produce 50 cakes compared to 500 cakes.

6. Tillie's Dog Biscuit Company has a monthly fixed cost of $15,000. It costs $1.50 to produce each bag of biscuits. A bag of these biscuits sells for $4.00.

Find the cost function to produce x bags of biscuits.

Find the revenue function from selling x bags of biscuits.

Find the profit function on x bags of biscuits.

How many bags of biscuits need to be sold to break even?

7. The function below represents the projected sales (in thousands of dollars) for a new line of eco-friendly cleaning products over the next 10 years.

$$S(x)=0.3x3−0.7x2+3x+5$$

What are the projected sales for the current year?

What sales are expected for Year 3? Year 9?

8. In a certain city, the average hourly rainfall in inches during a storm can be approximated by the following piecewise function, where t represents the number of hours since the storm began:

$$R(t)=\begin{cases} 0.5t & \text{if } 0 \le t \le 4 \\ 2 & \text{if } 4 < t \le 6 \\ -0.25t+3.5 & \text{if } 6 < t \le 12 \end{cases}$$

Find the average hourly rainfall after 3 hours.

Find the average hourly rainfall after 9 hours.

9. Determine the vertex of the parabola. $y = -2(x+3)^2 + 5$

Does the parabola open up or down?

Does it have a minimum or maximum value?

What is the vertex?

10. Find the equilibrium quantity (q) and the equilibrium price (P) for artisanal coffee beans.

Price-supply: $S=21q^2$

Price-demand: $D=-3q+50$

Sketch the lines.