

WORKSHEET 1

Problem 1. Find an equation for each of the following lines in slope-intercept form.

- (a) The line through $(5, -4)$ and $(1, 3)$.
- (b) The line through $(3, 5)$ and parallel to $y = 4$.
- (c) The line through $(3, -4)$ perpendicular to $x + y = 4$.

Problem 2. The total cost for a bakery to produce 100 gourmet cupcakes is \$126, while the total cost to produce 120 gourmet cupcakes is \$144. Let y represent the total cost for x gourmet cupcakes. Assume that a straight line can approximate the data.

- (a) Find and interpret the slope of the cost line for the gourmet cupcakes.
- (b) Determine an equation that models the data. Write the equation in slope-intercept form.
- (c) Determine an approximation of the cost of 180 gourmet cupcakes.

Problem 3. Let the supply and demand functions for sugar be given by

$$p = S(q) = 1.4q - 0.6 \text{ and } p = D(q) = -2q + 3.2,$$

where p is the price per pound and q is the quantity in thousands of pounds. Graph these on the same axes, and then find the equilibrium quantity and equilibrium price.

Problem 4. In recent years, the median income for all US households has declined. In 2007, the median income was \$55,627. By 2012, the median income had fallen to \$51,017. This decline has been roughly linear.

- (a) Determine an equation that approximates this decline in terms of t , where t represents the number of years since 2000.
- (b) Describe in words what the slope of this line represents.
- (c) If this trend continues, in what year will the median income drop below \$40,000?

Problem 5. Find the domain of each of the following functions.

- (a) $f(x) = \sqrt{4 - x^2}$
- (b) $f(x) = \frac{-8}{x^2 - 36}$

Problem 6. A rectangular field is to have perimeter 6000 ft.

- (a) Write the area A as a function of the width w .
- (b) Find the domain of the function in part (a).
- (c) Sketch a graph of the function and describe in words what that graph tells you about how the area of the field varies with the width.

Problem 7. The cost to rent a mid-size car is \$54 per day or fraction of a day. If the car is picked up in Pittsburg and dropped off in Cleveland, there is a fixed \$44 drop-off charge. Let $C(x)$ represent the cost of renting the car for x days, taking it from Pittsburg to Cleveland. Graph $y = C(x)$.

Problem 8. Sketch a graph of the function $f(x) = \sqrt{x - 2} + 2$.

Problem 9. If r is an x -intercept of the graph of $y = f(x)$, what is an x -intercept of the graph of each of the following?

- (a) $y = -f(x)$
- (b) $y = -f(-x)$
- (c) $y = f(-x)$

Problem 10. The manager of a 80-unit apartment complex is trying to decide what rent to charge. Experience has shown that at a rent of \$800, all the units will be full. On average, one additional unit will remain vacant for each \$25 increase. Let x denote the number of \$25 increases and let $T(x)$ be the total revenue from all rented apartments after x \$25 increases. Find an expression for $T(x)$, and calculate the value of x that leads to the maximum revenue.