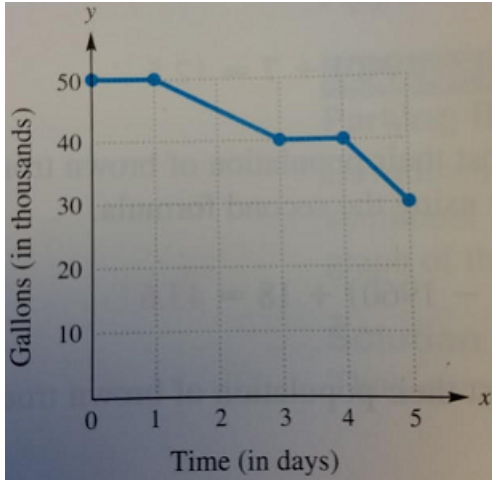


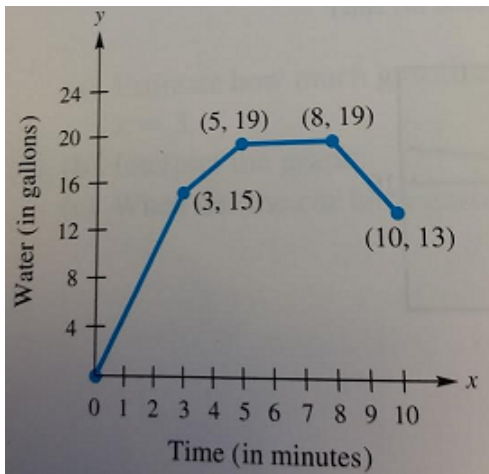
Worksheet 53 - Piecewise Functions

1. The graph of $y = f(x)$ represents the amount of water in thousands of gallons remaining in a swimming pool after x days.



- (a) What was the initial and final amounts of water contained in the pool?
- (b) When did the amount of water in the pool remain constant?
- (c) When was the pool level decreasing the fastest?
- (d) What is $f(2)$?
- (e) How much water was removed from the pool from $0 \leq x \leq 5$?

2. A water tank has an inlet pipe with a flow rate of 5 gallons per minute and an outlet pipe with a flow rate of 3 gallons per minute. A pipe can be either closed or completely open. The graph shows the number of gallons of water in the tank after x minutes. Use the slope to interpret what's happening during each piece of this graph.



3. The snow depth in Michigan's Isle Royale National Park varies throughout the winter. In a typical winter, the snow depth in inches is approximated by the function defined by

$$f(x) = \begin{cases} 6.5x & \text{if } 0 \leq x \leq 4 \\ -5.5x + 48 & \text{if } 4 < x \leq 6 \\ -30x + 195 & \text{if } 6 < x \leq 6.5 \end{cases}$$

where x represents the time in months, with $x = 0$ corresponding to the beginning of October, $x = 1$ to the beginning of November, and so on.

- (a) Graph the function for $0 \leq x \leq 6.5$.
- (b) In what month is the snow the deepest? What is the greatest snow depth?
- (c) Which months have the greatest rate of increase in snow depth? Which months have the greatest rate of decrease in snow depth?
4. Suppose that the charges for international phone calls are \$0.50 for the first minute and \$0.25 for each additional minute. Assume that a fraction of a minute is rounded up.
- (a) Determine the cost of a phone call lasting 3.5 minutes.
- (b) Find a formula for a function f that computes the cost of a telephone call x minutes long, where $0 < x \leq 5$. (Hint: Use the Least Integer Function $y = -\lceil x \rceil$ instead of the Greatest Integer Function $y = \lfloor x \rfloor$)

5. A 100-gallon tank is initially empty and then filled at a rate of 5 gallons per minute. Immediately after it is full, a pump is used to empty the tank at 2 gallons per minute.

(a) Sketch a graph that depicts the amount of water in the tank.

(b) Find a formula for a function w that computes the amount of water in the tank at time t minutes.

6. Sketch a graph showing the distance a person is from home after t hours if he or she drives on a straight road at 40 mph to a park 20 miles away, remains at the park for 2 hours, and then returns home at a speed of 20 mph.

(a) Sketch a graph.

(b) Find a formula for a function d that gives the distance the person is from home after t hours.