1.3.3 How can I walk a distance graph?

The Slope Walk

1-122. MATCH-A-GRAPH
As your class is attempting to create walks that are provided by your teacher, think about these questions:

- What information does each graph represent?
- What information is required to match the graph precisely?
- What directions would you need to give a classmate so that he or she could match the graph?

1-123. THE SLOPE WALK, Part One
Derive a method for walking each of the parent graphs listed below. In each case the graph will be distance versus time. Your goal is to get the basic shape of each equation, not to go through specific points. Feel free to analyze them in any order.

For each function below:

1. Sketch the graph of $f(x-5)+5$.
2. Walk the sketch. Set the motion detector to record ten seconds worth of data.
3. Write a description of the walk including information about where to start, where to turn around and when you should "speed up" or "slow down".

$f(x) = x^2$ $\quad f(x) = x^3$ $\quad f(x) = 2^x$

$f(x) = |x|$ $\quad f(x) = \frac{1}{x}$ $\quad f(x) = \sin x$

$f(x) = x$ $\quad (x-5)^2 + (y-5)^2 = 1$ $\quad f(x) = \sqrt{x}$

1-124. Complete the following.

a. Describe how walking the graphs of $y = x - 5$, $y = x + 5$, and $y = -x + 5$ would be similar and different.

b. Christian walked $y = x^2$ and C. J. walked $y = x^3$. How were they the same? How were they different?

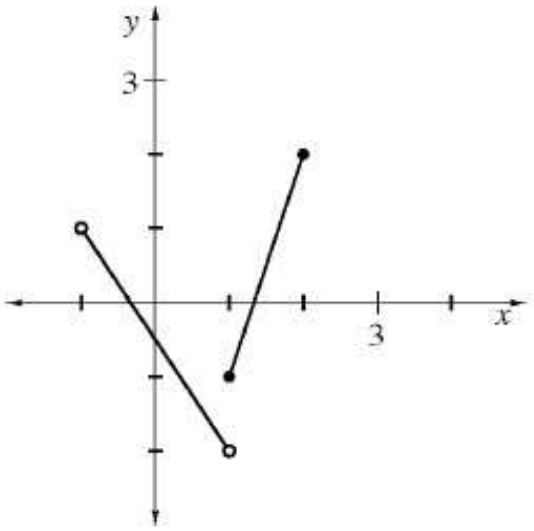
c. Adelyn walked $y = 2^x$ and Ara walked $y = \sqrt{x}$. Who had the greatest speed at the beginning? Who had the greatest speed at the end?

1-125. Carefully graph the function $f(x) = \begin{cases} 3x + 4 & \text{for } x < 1 \\ -\frac{1}{2}x + 5.5 & \text{for } x \geq 1 \end{cases}$ Homework Help ✎

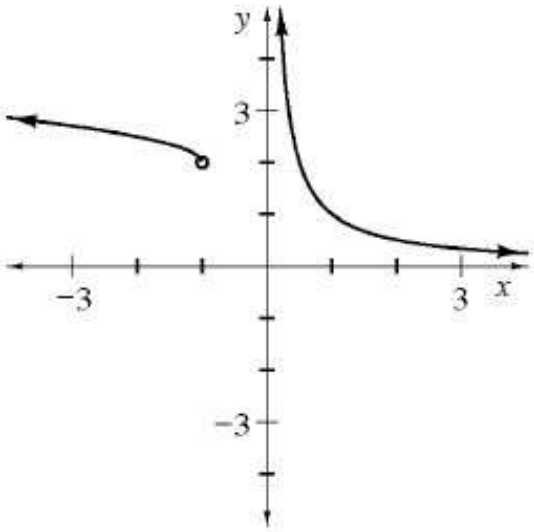
a. Iveta wants to find $A(f(x), -1 \leq x \leq 5)$, so she decided to split the region into 10 trapezoids and approximate the area. Explain to Iveta why this is not the most efficient method.

b. Calculate $A(f(x), -1 \leq x \leq 5)$.

1-126. Identify the domain and range of the functions below. Then write a possible piecewise function for each. Homework Help ✎



a.



b.

1-127. Approximate $A(f, -2 \leq x \leq 3)$ for $f(x) = x^2 - x - 6$ using 10 left endpoint rectangles. 1-127 HW eTool (Desmos). Homework Help ✎

1-128. While studying the finite differences of a particular function, Neo noticed that the differences changed linearly. What can you tell him about the original function? Also, how do his finite differences change? Homework Help ✎

1-129. Given: $g(x) = \frac{1}{x^2 - x}$ Homework Help ✎

a. Find the domain of $g(x)$.

b. Solve for x if $g(x) = 0.5$.

c. Explain why $g(x)$ does not have an inverse function.

1-130. Let $f(x) = x^2$ and $g(x) = \sqrt{x}$. Evaluate the following expressions. Homework Help ✎

a. $f(3)$

b. $f(-3)$

c. $g(9)$

d. $g(f(3))$

e. $g(f(6))$

f. $g(f(x))$

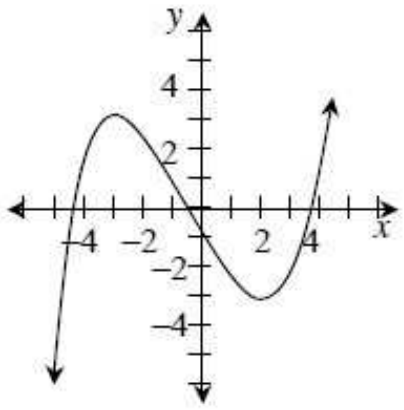
1-131. Examine two ways a line changes: Homework Help ✎

a. Sketch $f(x) = 4x + 1$. Find $f(0)$, $f(1)$, $f(2)$, and $f(3)$. How are the function values changing as x increases?

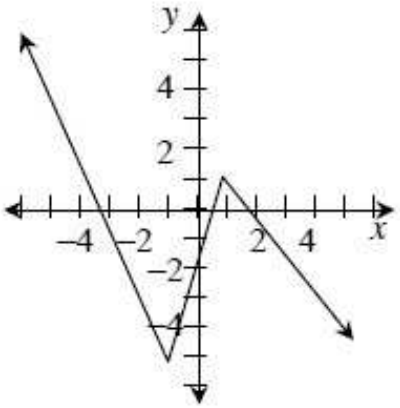
b. Find $A(f, 0 \le x \le a)$ for $a = 0$, 1,2, and 3. How are the areas changing as $a$increases?

1-132. For each graph below, state the intervals where the function is increasing and decreasing. Homework Help ✎

a.



b.



c. For part (a) on the interval in which the function is decreasing, is the rate of decrease constant? How do you know?