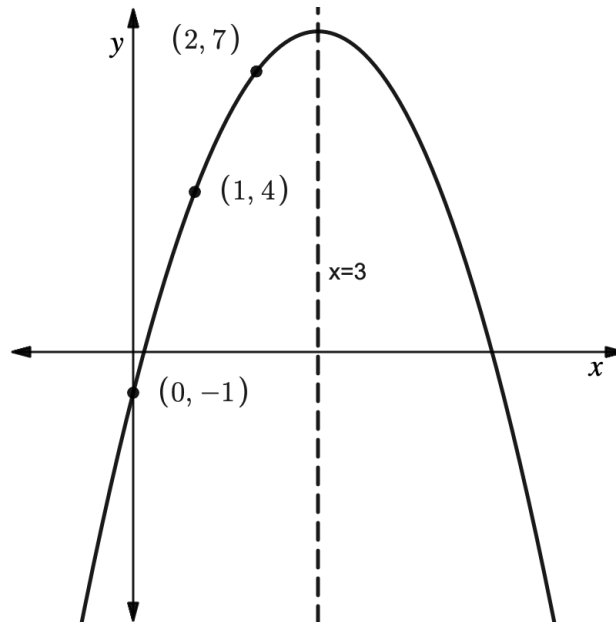


Problem 1: The graph of a parabolic function f is shown. The dashed line represents the axis of symmetry.



- a. Find the vertex of the parabola.





- b. Find $f(7)$.

- c. Find the slope of the secant line between $(0, f(0))$ and $(4, f(4))$.

- d. Find the average rate of change of f on the interval $[0,3]$.

- e. Order the following from least to greatest:
 - I. The instantaneous rate of change of f at $x = 0$
 - II. The average rate of change of f on the interval $[0,6]$
 - III. The instantaneous rate of change of f at $x = 3.5$
 - IV. The slope of the secant line between $x = 3$ and $x = 6$.

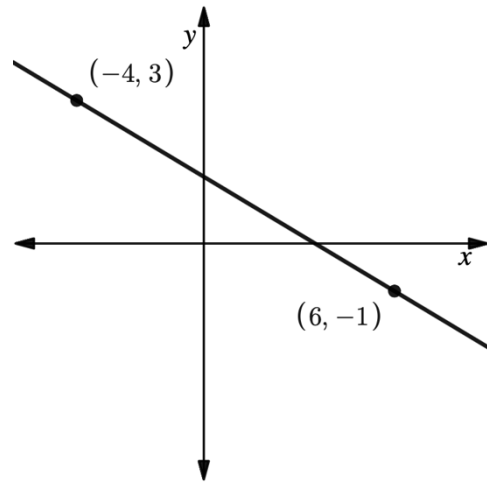
Problem 2: Prices for a small, medium, large, and extra-large hand-tossed cheese pizza from a pizza shop are given below.

	Small (10") Hand Tossed Pizza 410 Calories / 2 slices (1/3 of pizza)	\$7.99
Quantity: 1	<input type="button" value="Edit"/> <input type="button" value="Remove"/>	
<hr/>		
	Medium (12") Hand Tossed Pizza 210 Calories / 1 slice (1/8 of pizza)	\$9.99
Quantity: 1	<input type="button" value="Edit"/> <input type="button" value="Remove"/>	
<hr/>		
	Large (14") Hand Tossed Pizza 290 Calories / 1 slice (1/8 of pizza)	\$12.99
Quantity: 1	<input type="button" value="Edit"/> <input type="button" value="Remove"/>	
<hr/>		
	X-Large (16") Hand Tossed Pizza 380 Calories / 1 slice (1/8 of pizza)	\$14.99
Quantity: 1	<input type="button" value="Edit"/> <input type="button" value="Remove"/>	

- Is there a linear relationship between the diameter of the pizza and the price? Justify your answer.
- Consider the relationship between the diameter of the pizza and the number of square inches of pizza. Is the relationship linear, quadratic, or neither? Justify your answer.
- Is there a constant price per square inch of pizza? Justify your answer.
- Suppose there was a quadratic relationship between the diameter of a pizza and its price. If the prices of the small, medium, and large pizzas were the same as above, what should be the price of the X-Large pizza?
- There is an approximately linear relationship between the number of calories of a pizza, y , and the area of the pizza, x . Find and interpret the slope of this line.

Problem 3: Selected values of a linear function f are given in the table. Let g be the function whose graph is shown.

x	$f(x)$
2	1
5	-4
11	-14



- Find $\frac{f(1)-f(-4)}{5}$. What does this value represent?
- Find the change in the average rates of change of f over equal sized intervals of length 3.
- Which function, f or g , has the greater x -intercept? What is it?
- Find $g(31)$.
- Write an equation for $f(x)$.

Problem 4: One Saturday morning, Sarah ran 14.1 miles in 2 hours and 2 minutes. Information about her distance at various times in the run is given in the table below.

Time (minutes)	9.45	20.7	44.3	72.6	111.0	122
Distance (miles)	1	2.25	5	8.3	12.8	14.1

- What was Sarah's average speed during the run, in **miles per hour**?
- What was Sarah's average *pace* during the run, given in minutes and seconds per mile? (Ex: a pace of 9'21" means that a mile was run in 9 minutes and 21 seconds).
- Approximate Sarah's speed after 70 minutes. Was she running faster or slower than average at this point in her run?
- Over which interval of time given in the table was Sarah running the fastest?
- Do you think there was an instant when Sarah's instantaneous speed was exactly equal to her average speed over the entire run? Explain.