

**Student:** \_\_\_\_\_  
**Date:** \_\_\_\_\_  
**Time:** \_\_\_\_\_

**Instructor:** Josh Ducey  
**Program:** 199E: Precalculus/Algebra  
Gateway  
**Test Bank:** MyMathTest: Basic Algebra,  
Precalculus and Calculus

**Assignment:** Qualifier 2: Functions and  
Graphs

1. Find the difference quotient of  $f$ ; that is, find  $\frac{f(x+h) - f(x)}{h}$ ,  $h \neq 0$ , for the following function.  
Be sure to fully simplify.

$$f(x) = \sqrt{14x}$$

$$\frac{f(x+h) - f(x)}{h} = \boxed{\phantom{000}} \text{ (Simplify your answer.)}$$

2. Find the difference quotient of  $f$ ; that is, find  $\frac{f(x+h) - f(x)}{h}$ ,  $h \neq 0$ , for the following function.  
Be sure to simplify.

$$f(x) = x^2 - 6x + 8$$

$$\frac{f(x+h) - f(x)}{h} = \boxed{\phantom{000}} \text{ (Simplify your answer.)}$$

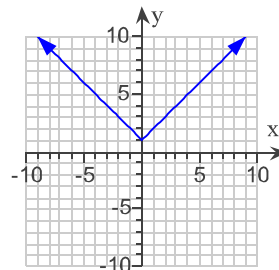
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3. Use the graph to determine the following.

- a. the function's domain
- b. the function's range
- c. the x-intercepts, if any
- d. the y-intercept, if any
- e. the function values,  $f(-1)$  and  $f(4)$ .



Assume that the graph of the function continues its trend beyond the displayed coordinate grid.

a. What is the function's domain?

(Type your answer in interval notation.)

b. What is the function's range?

(Type your answer in interval notation.)

c. Find the x-intercept(s), if there are any. Select the correct choice below and fill in any answer boxes within your choice.

A.  (Type an integer. Use a comma to separate answers as needed.)

B. There is no x-intercept.

d. Find the y-intercept(s), if there are any. Select the correct choice below and fill in any answer boxes within your choice.

A.  (Type an integer. Use a comma to separate answers as needed.)

B. There is no y-intercept.

e. Find the values of the function.

$$f(-1) = \text{}$$

$$f(4) = \text{}$$

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4. Graph the rational function. Answer parts 1. through 6. below.

$$f(x) = \frac{x^2 + x - 2}{x^2 - 16}$$

1. Select the symmetry of the function.

- The function is symmetric about the y-axis.
- The function is symmetric about the origin.
- The function has no symmetry about the y-axis or the origin.

2. Find the y-intercept. Select the correct choice below and fill in any answer boxes within your choice.

- A. The y-intercept is . (Type an integer or a simplified fraction.)
- B. There is no y-intercept.

3. Find any x-intercepts. Select the correct choice below and fill in any answer boxes within your choice.

- A. The x-intercept(s) is/are .  
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- B. There are no x-intercepts.

4. What are the x-coordinates of the vertical asymptote(s)? Select the correct choice below and fill in any answer boxes within your choice.

- A.  $x =$    
(Use a comma to separate answers as needed.)
- B. There are no vertical asymptotes.

5. What is the y-coordinate of the horizontal asymptote? Select the correct choice below and fill in any answer boxes within your choice.

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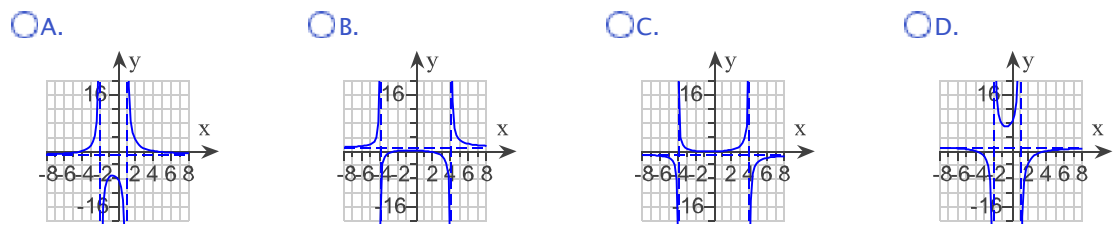
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4.  
(cont.)

- A.  $y = \blacksquare$   
 B. There is no horizontal asymptote.

6. Using the information determined above, select the graph of the rational function.



5. Find the average rate of change of the function  $f(x) = x^2 + 7x$  from  $x_1 = 1$  to  $x_2 = 5$ .

The average rate of change is .

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6. Given the function  $f(x) = \sqrt{x-8}$ ,

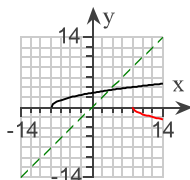
- (a) Find  $f^{-1}(x)$ .  
(b) Graph  $f$  and  $f^{-1}$  in the same rectangular coordinate system.  
(c) Use interval notation to give the domain and the range of  $f$  and  $f^{-1}$ .

(a) Find  $f^{-1}(x)$ .

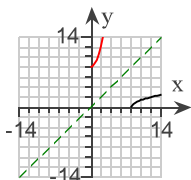
$$f^{-1}(x) = \square; x \geq \square$$

b) Choose the correct graph which shows  $f$  and  $f^{-1}$  graphed in the same coordinate system.

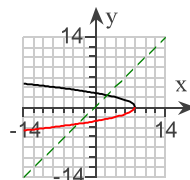
A.



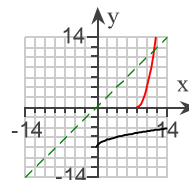
B.



C.



D.



(c) State the domain and range of  $f$  and  $f^{-1}$  using interval notation.

$$\text{Domain of } f = \text{Range of } f^{-1} = \square$$

$$\text{Range of } f = \text{Domain of } f^{-1} = \square$$

7. The function  $f(x) = \frac{5x+4}{x-7}$  is one-to-one.

Find an equation for  $f^{-1}(x)$ , the inverse function.

$$f^{-1}(x) = \square$$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

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8. Evaluate the function  $f(x) = x^2 - 2x + 1$  at the given values of the independent variable and simplify.

- a.  $f(-3)$     b.  $f(x+8)$     c.  $f(-x)$

a.  $f(-3) = \square$

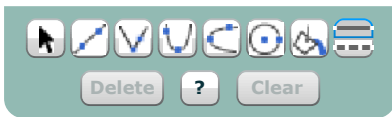
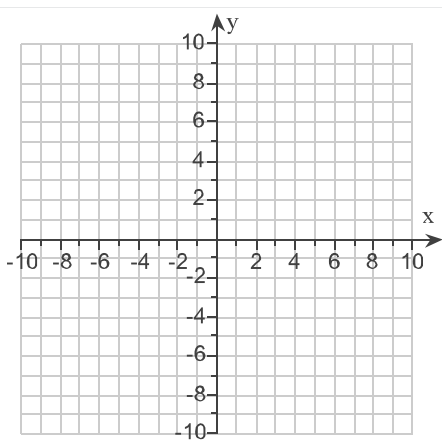
b.  $f(x+8) = \square$

c.  $f(-x) = \square$

9. Use transformations of  $f(x) = x^2$  to graph the following function.

$$g(x) = (x + 5)^2 - 1$$

Use the graphing tool to graph the function.

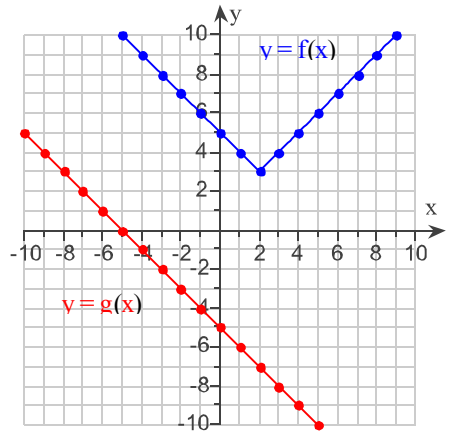


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10. Use the graphs of  $f$  and  $g$  to evaluate the composite function.  
 $(f \circ g)(-1)$



$(f \circ g)(-1) = \square$