

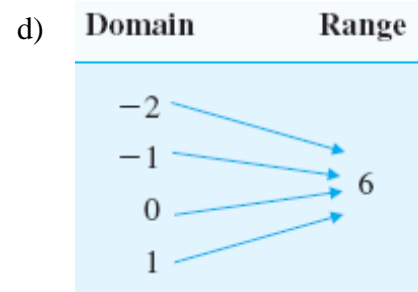
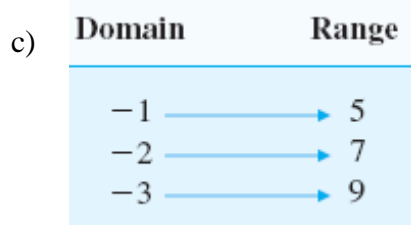
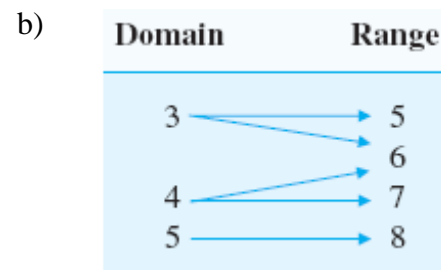
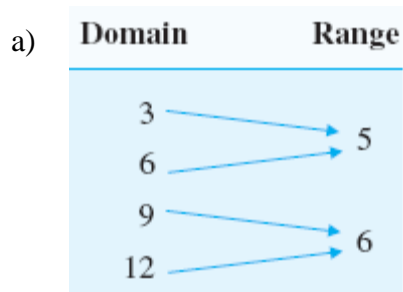
**Problem 1****1 Point**

Which of the following transforms the graph of  $y = x^3$  into the graph of  $y - 4 = (x - 5)^3$ ?

- a) shift down 4, left 5;
- b) shift down 4, right 5;
- c) shift up 4, left 5;
- d) shift up 4, right 5.

**Problem 2****1 Point**

Which correspondence don't specifies the function?



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**Problem 3****1 Point**

If the value of dependent variable  $y$  decreases as the value of independent variable  $x$  increases, the graph of this relationship could be a

- a) horizontal line;
- b) vertical line;
- c) line with a negative slope;
- d) line with a positive slope.

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**Problem 4****2 Points**

The average (arithmetic mean) of 5, 8, 2, 7 and  $k$  is 0. What is the median of this set?

- a) 0
- b) 5
- c) 3.75
- d) 3.5

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**Problem 5****2 Points**

The average (arithmetic mean) of seven integers is 11. If each of these integers is less than 20, then what is the least possible value of any one of these integers?

- a)  $-113$
- b)  $-77$
- c) 0
- d)  $-37$

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**Problem 6****2 Points**Find  $y'(0)$  for  $y = e^{x^3-2x+1}$ .

- a) 1                      b)  $-2e$                       c)  $e$                       d)  $-\frac{2}{e}$

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**Problem 7****2 Points**If  $f(x) = \frac{x-4}{2(x-1)}$  and  $g(x) = 3-x$ , which of the following is NOT in the domain of  $f(g(x))$ ?

- a) -1                      b) 1                      c) 2                      d) 3

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**Problem 8****1 Point**Which of the following could be the equation of a line perpendicular to the line  $y = -2x - 3$ ?

- a)  $y = \frac{1}{2}x - 7$                       b)  $y = -\frac{1}{2}x + 7$                       c)  $y = -2x + 3$                       d)  $y = -2x - 3$



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**Problem 12****Point 1**

Find the slope of the secant line joining  $(2, f(2))$  and  $(3, f(3))$  for  $f(x) = -3x^2 - 8$ .

- a) 15                      b) 55                      c) -55                      d) -15

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**Problem 13****2 Points**

Determine the points at which the function  $f(x) = \begin{cases} x^2 - 9, & \text{for } x < -1 \\ 0, & \text{for } -1 \leq x \leq 1 \\ x^2 + 9, & \text{for } x > 1 \end{cases}$  is discontinuous.

- a) -1; 1                      b) 1                      c) -1; 0; 1                      d) None

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**Problem 14****2 Points**

A jar contains 9 blue marbles, 6 green marbles, and 12 red marbles. How many blue marbles must be added so that the probability of choosing a blue marble at random is  $\frac{3}{5}$ ?

- a) 3                      b) 12                      c) 16                      d) 18

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**Problem 15****2 Points**

A fair six-sided die has faces bearing the numbers 1, 2, 3, 4, 5, and 6. When the die is thrown, the numbers on the five visible faces are added. What is the probability that this sum is greater than 17?

- a)  $\frac{1}{3}$                       b)  $\frac{1}{6}$                       c)  $\frac{1}{2}$                       d)  $\frac{2}{3}$

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**Problem 16****3 Points**

Which of the following statements is always true if  $A$ ,  $B$  and  $C$  are arbitrary  $2 \times 2$  matrices?

- a)  $AB = BA$ ;  
b) If  $AB = 0$ , then either  $A = 0$  or  $B = 0$ ;  
c)  $A(B + C) = AB + AC$ ;  
d) If  $AB = AC$  and  $A \neq 0$ , then  $B = C$ .

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**Problem 17****3 Points**

Given  $f(x) = 2x + \frac{8}{x}$ ,  $x < 0$ , find the values of  $x$  corresponding to local maxima and local minima.

- a) local maximum at  $x = -2$ , local minimum at  $x = 2$ ;
- b) local maximum at  $x = -2$  (no local minimum);
- c) local minimum at  $x = -2$  (no local maximum);
- d) no local maximum or minimum.

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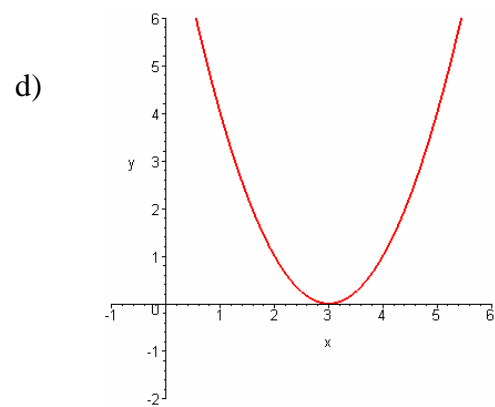
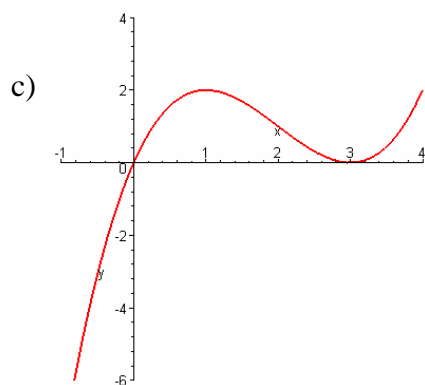
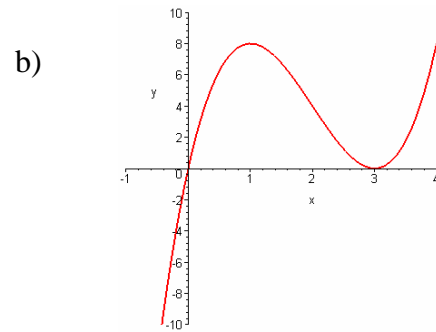
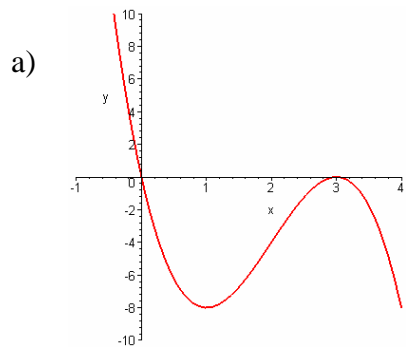
**Problem 18****3 Points**

The rational function  $R(x) = \frac{x^2 - 1}{x - 4}$  has a

- a) vertical asymptote of  $x = 4$  and horizontal asymptote of  $y = 1$ ;
- b) vertical asymptote of  $x = 4$  and no horizontal asymptotes;
- c) no vertical asymptote and horizontal asymptote of  $y = 1$ ;
- d) no vertical asymptote and no horizontal asymptote.

**Problem 19****3 Points**

Which of the following could be the graph of the function  $f(x) = 2x^3 - 12x^2 + 18x$ ?



**Problem 20****3 Points**

If the graph on the right is the graph of  $y' = f'(x)$ , which of the following could be the graph of  $y = f(x)$ ?

