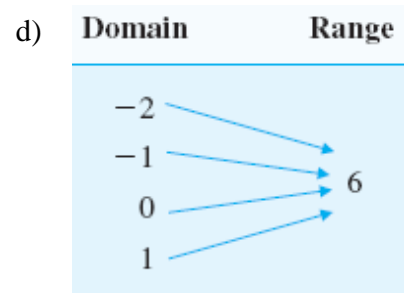
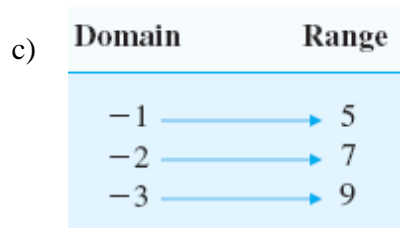
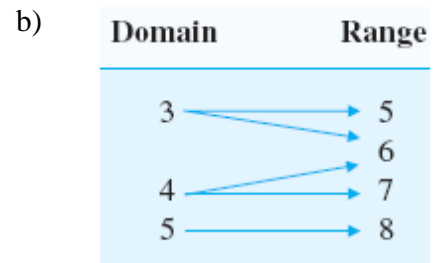
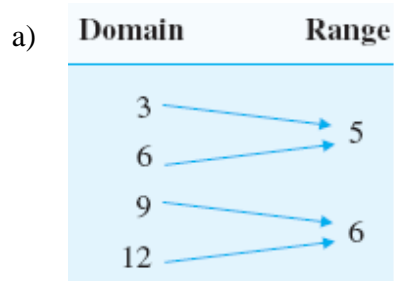

Problem 1**1 Point**

Which correspondence does not specifies the function?



Problem 2**1 Point**A sequence is recursively defined by $x_n = 3x_{n-1} - x_{n-2}$, for $n > 2$. If $x_1 = x_2 = 1$, what is the value of x_6 ?

- a) -2;
- b) 5;
- c) 13;
- d) 34

Problem 3**1 Point**

If function f is defined by formula $f(x) = xe^{3x}$ then $f'(2) =$

- a) $3e^6$;
- b) $7e^6$;
- c) e^6 ;
- d) e^3 .

Problem 4**2 Points**

For a class test, the mean score was 60, the median score was 65, and the standard deviation of the scores was 6. The teacher decided to add 4 points to each score due to a grading error. Which of the following statements must be true for the new scores?

- I. The new mean score is 64.
 - II. The new median score is 69.
 - III. The new standard deviation of the scores is 10.
-
- a) I only
 - b) II only
 - c) I and II only
 - d) I, II and III

Problem 5**2 Points**

In a group of 15 people, 60 percent have brown eyes. Two people are to be selected at random from the group. What is the probability that **neither** person selected will have brown eyes?

- a) $\frac{1}{7}$
- b) $\frac{1}{4}$
- c) $\frac{2}{3}$
- d) $\frac{7}{8}$

Problem 6**2 Points**

Suppose the graph of $f(x) = -x^2$ is translated 4 units left and 1 unit down. If the resulting graph represents $g(x)$, what is the value of $g(-3)$?

- a) -50 b) -48 c) -2 d) 0

Problem 7**2 Points**

What is the range of the function defined by $f(x) = 2 + \frac{2}{x}$?

- a) $[2; +\infty)$
b) $(-\infty; 2) \cup (2; +\infty)$
c) $(-\infty; +\infty)$
d) $(-\infty; 1) \cup (1; +\infty)$

Problem 8**1 Point**

Find x if a tangent line of the graph of function $f(x) = \frac{1}{4}x^4 - 8x + 1$ at a point $(x; f(x))$ in Oxy plane is parallel to the line $y = 1$.

- a) -2
b) $\sqrt[3]{9}$
c) 0
d) 2

Problem 9**2 Points**

In the Oxy -plane, what is the area of a triangle whose vertices are $(\sqrt{2}; 0)$, $(2; 6)$ and $(\sqrt{8}; 0)$?

- a) 4
- b) 16
- c) $2\sqrt{6}$
- d) $3\sqrt{2}$

Problem 10**2 Points**

The rational function $R(x) = \frac{x^2 - 9}{x^2 - 2x - 3}$ has a

- a) vertical asymptotes at $x = 3$ and $x = -1$ and horizontal asymptote $y = 1$;
- b) vertical asymptote at $x = -1$ and no horizontal asymptote;
- c) vertical asymptotes at $x = 3$ and $x = -1$ and no horizontal asymptote;
- d) vertical asymptote at $x = -1$ and horizontal asymptote $y = 1$.

Problem 11**2 Points**

$$\lim_{n \rightarrow \infty} \left(1 + \frac{2}{n^2}\right)^{\frac{n}{4}} =$$

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

Problem 12**Point 1**

Let A be a 2×2 matrix. Which of the following statements must be true?

- I. All of the entries of A^2 are nonnegative.
- II. The determinant of A^2 is nonnegative.
- III. If A^2 is an invertible then A also is an invertible.

- a) I only;
- b) II only
- c) II and III only
- d) I, II, and III

Problem 13**2 Points**

If $x - 2$ is a factor of $x^3 + kx^2 + 12x - 8$, then $k =$

- a) -3 ;
- b) -6 ;
- c) 2 ;
- d) 3 .

Problem 14**2 Points**

Let p be the number of real solutions of the equation $3^x + x - 3 = 0$ in the interval $[0; 1]$, and let q be the number of real solutions that are not in $[0; 1]$. Which of the following is true?

- a) $p = 0$ and $q = 1$;
- b) $p = 1$ and $q = 1$;
- c) $p = 1$ and $q = 0$;
- d) $p = 1$ and $q > 1$.

Problem 15**2 Points**

How many real roots does the polynomial $x^7 + 5x + 12 = 0$ have?

- a) None;
- b) One;
- c) Three;
- d) Seven.

Problem 16**3 Points**

If f and g are arbitrarily chosen functions from \mathbb{R} to \mathbb{R} , then their graphs in Oxy plane are symmetric with respect an axis $y = 1$ if for any $x \in \mathbb{R}$

- a) $g(x) = 2 - f(x)$;
- b) $g(x) = 1 - f(x)$;
- c) $g(x) = -f(x)$;
- d) $g(x) = 1 - f(-x)$.

a) $\sqrt{3}$

b) 0

c) $\frac{1}{\sqrt{3}}$

d) 2

Problem 17**3 Points**

If a function f is defined by formula $f(x) = \sqrt[3]{1+x^3}$ and g is an inverse function of f , then

a) $g(x) = \sqrt[3]{x^3 - 1}$

b) $g(x) = \frac{1}{\sqrt[3]{1+x^3}}$

c) $g(x) = -\sqrt[3]{1+x^3}$

d) $g(x) = \sqrt[3]{1-x^3}$

Problem 18**3 Points**

The function f is defined by $f(x) = 2x^3 - 6x^2 - 18x + 3$ for $-2 \leq x \leq 3$.

What is the difference between the maximum and minimum values of f ?

a) 64

b) 50

c) 44

d) 36

Problem 19**3 Points**

For what value of a is the line $y = 5x$ tangent to the curve $y = e^{ax}$ at some point in the Oxy -plane?

a) $\frac{5}{e}$

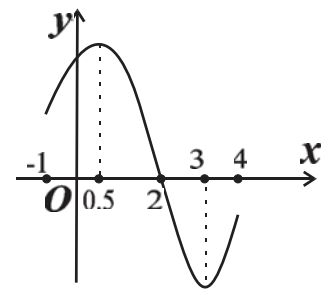
b) 5

c) $5e$

d) $\sqrt[5]{e}$

Problem 20**3 Points**

The differentiable function $y = f(x)$ is defined on the interval $(-1; 4)$. On the picture is given the graph of a derivative function $y = f'(x)$. Find the point where the function $y = f(x)$ takes the local minimum and local maximum.



- a) $x_{\min} = 3; x_{\max} = 0.5$
- b) $x_{\min} = 3; x_{\max} = 2$
- c) $x_{\min} = 3$; No local maximum
- d) No local minima; $x_{\max} = 2$