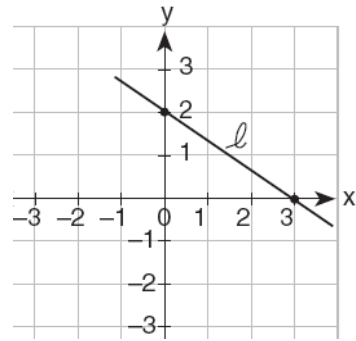


**Problem 1****1 Point**

What is the slope of line  $l$  in the accompanying diagram?



a)  $-\frac{2}{3}$

b)  $-\frac{3}{2}$

c)  $\frac{3}{2}$

d)  $\frac{2}{3}$

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

Consider the function  $f(x) = \sqrt{\frac{9-x^2}{x^2}}$ . For which of the following functions  $f(x) = g(h(x))$ ?

a)  $g(x) = |x|$ ;  $h(x) = \frac{9-x^2}{x^2}$ ;

b)  $g(x) = x^2$ ;  $h(x) = \sqrt{\frac{3-x}{x}}$ ;

c)  $g(x) = \sqrt{\frac{9-x}{x}}$ ;  $h(x) = x^2$ ;

d)  $g(x) = \sqrt{\frac{3-x}{x}}$ ;  $h(x) = x^2$ ;

---

**Problem 3****2 Points**

Two real numbers,  $x$  and  $y$ , are randomly chosen between 0 and 1. What is the probability that  $x + y$  will be less than 1?

- a) 0                      b)  $\frac{1}{4}$                       c)  $\frac{1}{2}$                       d)  $\frac{2}{3}$

---

**Problem 4****1 Point**

Which of the following could be the equation of a line parallel to the line  $y = 4x - 7$ ?

- a)  $y = \frac{1}{4}x - 7$                       b)  $y = -\frac{1}{4}x - 7$                       c)  $y = -4x + 3$                       d)  $y = 4x + 3$

---

**Problem 5****1 Point**

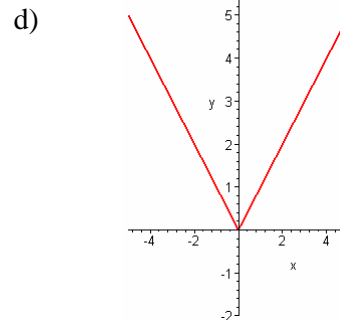
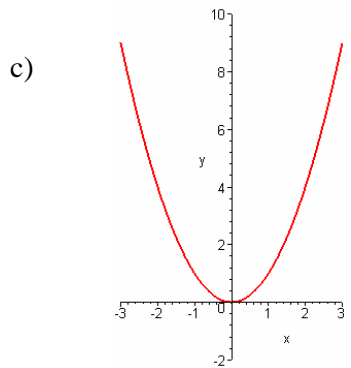
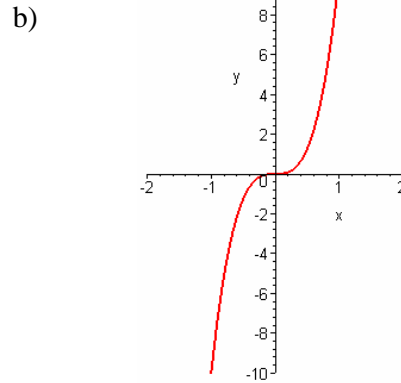
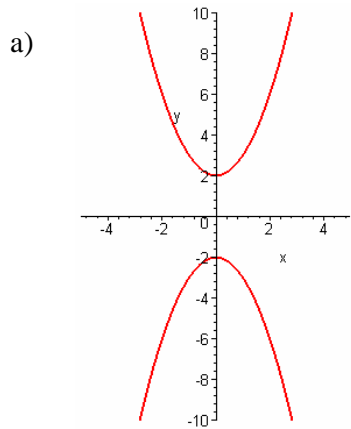
Which equation represents a function of type  $y = f(x)$ ?

- a)  $4y^2 = 36 - 9x^2$                       b)  $3x = x^2 - y - 4$                       c)  $x^2 + y^2 = 4$                       d)  $x = y^2 - 6x + 8$

---

**Problem 6****1 Point**

Which diagram represents a one-to-one function?



---

**Problem 7****1 Point**If the value of dependent variable  $y$  increases 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.

---

**Problem 8****2 Points**

A pair of well-balanced dice is rolled. Determine the probability that the sum of the numbers that turn up is greater than 9.

a)  $\frac{1}{12}$

b)  $\frac{1}{6}$

c)  $\frac{2}{9}$

d) 1

---

**Problem 9****2 Points**

Find the median of the following data 18,  $k$ , 5, 12, 11, 7, 22, if it is known that the average of this data is 13 ?

a) 11

b) 12

c) 12,5

d) 13,5

---

**Problem 10****2 Points**

If the range of the six measurements 140, 125, 180, 110, 165, and  $x$  is 80, which of the following could be the value of  $x$ ?

a) 60

b) 85

c) 190

d) 220

---

**Problem 11****2 Points**

Find  $y'$  for  $y = \frac{\ln x}{x^2}$ .

a)  $\frac{1}{2x^3}$

b)  $\frac{2 \ln x - 1}{x^3}$

c)  $2 \ln x - 1$

d)  $\frac{1 - 2 \ln x}{x^3}$

---

**Problem 12****2 Points**

The  $x$ -intercepts of  $y = f(x)$  are 6, 3 and  $-1$ . Find the  $x$ -intercepts of  $y = f(x+2)$ .

a)  $-3, 1, \text{ and } 4$ ;

b)  $1, 5, \text{ and } 8$ ;

c)  $-1, 3, \text{ and } 6$ ;

d)  $-2, 6, \text{ and } 12$ .

---

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

Which of the following numbers is NOT the sum of three consecutive odd integers?

a) 15

b) 75

c) 297

d) 313

---

**Problem 14****3 Points**

The rational function  $R(x) = \frac{x^3 - 4x^2 + x + 6}{x + 5}$  has a

- a) vertical asymptote of  $x = 5$  and horizontal asymptote of  $y = 1$ ;
- b) vertical asymptote of  $x = 5$  and no horizontal asymptotes;
- c) vertical asymptote of  $x = -5$  and no horizontal asymptotes;
- d) vertical asymptote of  $x = -5$  and horizontal asymptote of  $y = 0$ .

---

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

Let  $f$  be the function defined on the set of all real numbers by the formula

$$f(x) = \begin{cases} \frac{x^2 - 2}{x - \sqrt{2}}, & \text{if } x \neq \sqrt{2}, \\ a, & \text{if } x = \sqrt{2}. \end{cases}$$

For what value of  $a$ , the function  $f$  will be continuous?

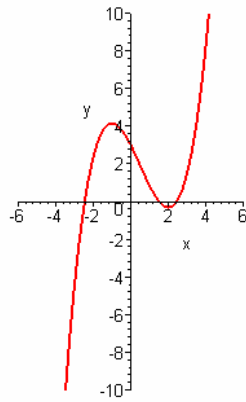
- a)  $-2\sqrt{2}$                       b) 0                      c)  $2\sqrt{2}$                       d)  $\sqrt{2}$

**Problem 16**

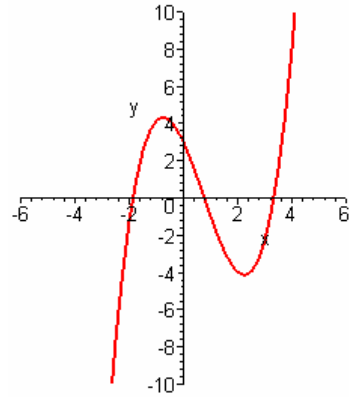
**3 Points**

Which of the following could be the graph of the function  $f(x) = \frac{x^3}{3} - \frac{x^2}{2} - 2x + 3$ ?

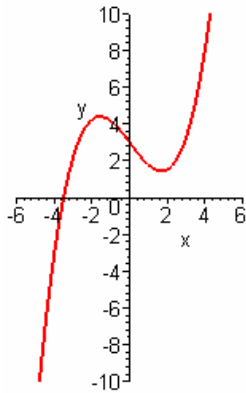
a)



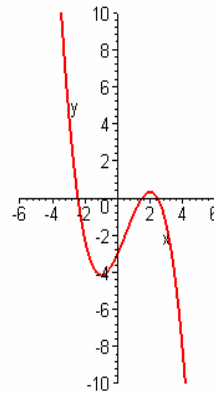
b)



c)



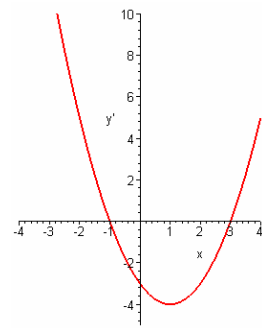
d)



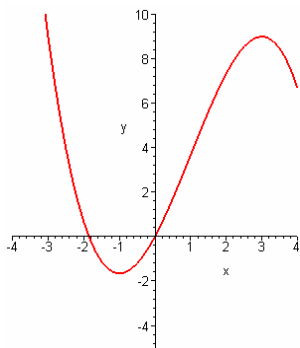
**Problem 17**

**3 Points**

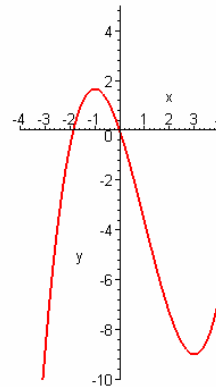
If the graph on the right is the graph of  $y' = f'(x)$ , which of the following could be the graph of  $y = f(x)$ ?



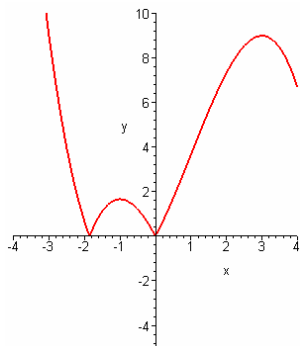
a)



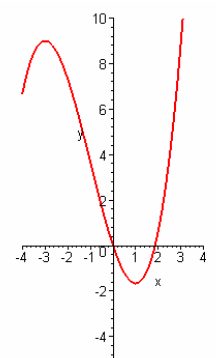
b)



c)



d)



---

**Problem 18****2 Points**

In the rectangular coordinate system, if point  $(a, b)$ , and the two points  $(4a, b)$  and  $(2a, 2b)$ , were connected by straight lines, then the area of the resulting triangular region, in terms of  $a$  and  $b$ , would be

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

---

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

If matrix  $A = \begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix}$  then  $A^{-1} =$

- a)  $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}$                       b)  $\begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix}$                       c)  $\begin{pmatrix} 2 & -3 \\ -1 & 2 \end{pmatrix}$                       d)  $\begin{pmatrix} -3 & 2 \\ 2 & -1 \end{pmatrix}$

---

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

Find the absolute maximum and minimum values of  $f(x) = \frac{x^3}{3} - 3x^2 + 5x + 13$  on the interval  $[0; 2]$ .

- a)  $f_{\min} = 13; f_{\max} = \frac{46}{3};$   
b)  $f_{\min} = \frac{14}{3}; f_{\max} = \frac{46}{3};$   
c)  $f_{\min} = \frac{41}{3}; f_{\max} = \frac{46}{3};$   
d)  $f_{\min} = 0; f_{\max} = 13.$

---

**Problem 1****1 Point**Which equation represents a function of type  $y = f(x)$ ?

a)  $4y^2 = 36 - 9x^2$

b)  $3x = x^2 - y - 4$

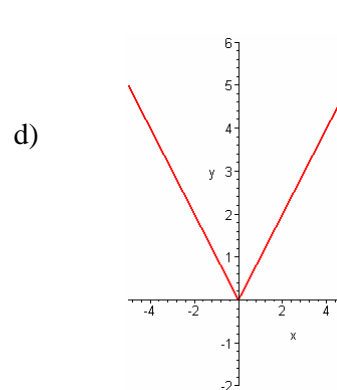
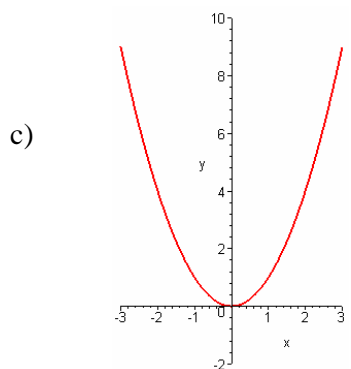
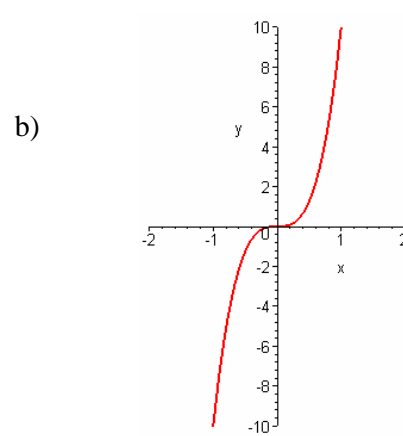
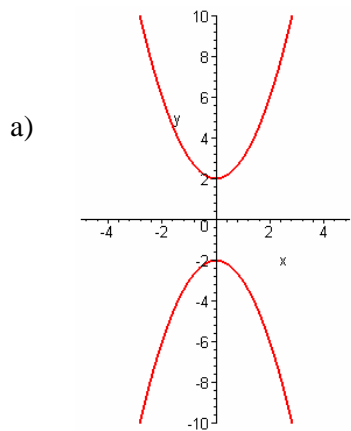
c)  $x^2 + y^2 = 4$

d)  $x = y^2 - 6x + 8$

---

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

Which diagram represents a one-to-one function?



---

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

If the value of dependent variable  $y$  increases 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.

---

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

Find the median of the following data 18,  $k$ , 5, 12, 11, 7, 22, if it is known that the average of this data is 13 ?

- a) 11
- b) 12
- c) 12,5
- d) 13,5

---

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

If the range of the six measurements 140, 125, 180, 110, 165, and  $x$  is 80, which of the following could be the value of  $x$ ?

- a) 60
- b) 85
- c) 190
- d) 220

---

**Problem 6****2 Points**Find  $y'$  for  $y = \frac{\ln x}{x^2}$ .

a)  $\frac{1}{2x^3}$

b)  $\frac{2\ln x - 1}{x^3}$

c)  $2\ln x - 1$

d)  $\frac{1 - 2\ln x}{x^3}$

---

**Problem 7****2 Points**Consider the function  $f(x) = \sqrt{\frac{9-x^2}{x^2}}$ . For which of the following functions  $f(x) = g(h(x))$ ?

a)  $g(x) = |x|$ ;  $h(x) = \frac{9-x^2}{x^2}$ ;

b)  $g(x) = x^2$ ;  $h(x) = \sqrt{\frac{3-x}{x}}$ ;

c)  $g(x) = \sqrt{\frac{9-x}{x}}$ ;  $h(x) = x^2$ ;

d)  $g(x) = \sqrt{\frac{3-x}{x}}$ ;  $h(x) = x^2$ ;

---

**Problem 8****1 Point**Which of the following could be the equation of a line parallel to the line  $y = 4x - 7$ ?

a)  $y = \frac{1}{4}x - 7$

b)  $y = -\frac{1}{4}x - 7$

c)  $y = -4x + 3$

d)  $y = 4x + 3$

---

**Problem 9****2 Points**

Which of the following numbers is NOT the sum of three consecutive odd integers?

- a) 15                      b) 75                      c) 297                      d) 313

---

**Problem 10****2 Points**

The  $x$ -intercepts of  $y = f(x)$  are 6, 3 and  $-1$ . Find the  $x$ -intercepts of  $y = f(x+2)$ .

- a)  $-3, 1$ , and  $4$ ;              b)  $1, 5$ , and  $8$ ;              c)  $-1, 3$ , and  $6$ ;              d)  $-2, 6$ , and  $12$ .

---

**Problem 11****2 Points**

Let  $f$  be the function defined on the set of all real numbers by the formula

$$f(x) = \begin{cases} \frac{x^2 - 2}{x - \sqrt{2}}, & \text{if } x \neq \sqrt{2}, \\ a, & \text{if } x = \sqrt{2}. \end{cases}$$

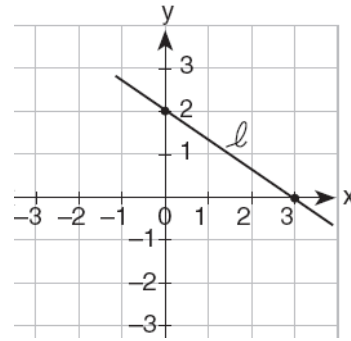
For what value of  $a$ , the function  $f$  will be continuous?

- a)  $-2\sqrt{2}$                       b)  $0$                       c)  $2\sqrt{2}$                       d)  $\sqrt{2}$

---

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

What is the slope of line  $l$  in the accompanying diagram?



a)  $-\frac{2}{3}$

b)  $-\frac{3}{2}$

c)  $\frac{3}{2}$

d)  $\frac{2}{3}$

---

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

Two real numbers,  $x$  and  $y$ , are randomly chosen between 0 and 1. What is the probability that  $x + y$  will be less than 1?

a) 0

b)  $\frac{1}{4}$

c)  $\frac{1}{2}$

d)  $\frac{2}{3}$

---

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

A pair of well-balanced dice is rolled. Determine the probability that the sum of the numbers that turn up is greater than 9.

a)  $\frac{1}{12}$

b)  $\frac{1}{6}$

c)  $\frac{2}{9}$

d) 1

---

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

In the rectangular coordinate system, if point  $(a, b)$ , and the two points  $(4a, b)$  and  $(2a, 2b)$ , were connected by straight lines, then the area of the resulting triangular region, in terms of  $a$  and  $b$ , would be

a)  $\frac{ab}{2}$

b)  $ab$

c)  $\frac{3ab}{2}$

d)  $2ab$

---

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

If matrix  $A = \begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix}$  then  $A^{-1} =$

a)  $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}$

b)  $\begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix}$

c)  $\begin{pmatrix} 2 & -3 \\ -1 & 2 \end{pmatrix}$

d)  $\begin{pmatrix} -3 & 2 \\ 2 & -1 \end{pmatrix}$

---

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

Find the absolute maximum and minimum values of  $f(x) = \frac{x^3}{3} - 3x^2 + 5x + 13$  on the interval  $[0; 2]$ .

a)  $f_{\min} = 13; f_{\max} = \frac{46}{3};$

b)  $f_{\min} = \frac{14}{3}; f_{\max} = \frac{46}{3};$

c)  $f_{\min} = \frac{41}{3}; f_{\max} = \frac{46}{3};$

d)  $f_{\min} = 0; f_{\max} = 13.$

---

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

The rational function  $R(x) = \frac{x^3 - 4x^2 + x + 6}{x + 5}$  has a

a) vertical asymptote of  $x = 5$  and horizontal asymptote of  $y = 1$ ;

b) vertical asymptote of  $x = 5$  and no horizontal asymptotes;

c) vertical asymptote of  $x = -5$  and no horizontal asymptotes;

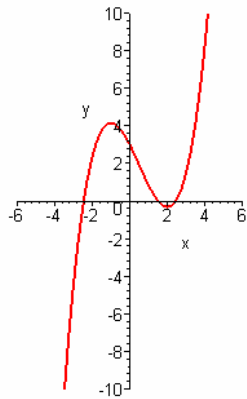
d) vertical asymptote of  $x = -5$  and horizontal asymptote of  $y = 0$ .

**Problem 19**

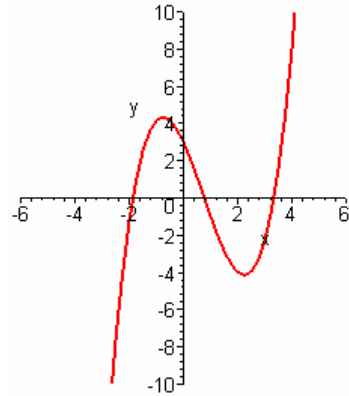
**3 Points**

Which of the following could be the graph of the function  $f(x) = \frac{x^3}{3} - \frac{x^2}{2} - 2x + 3$ ?

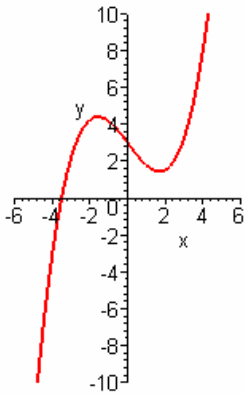
a)



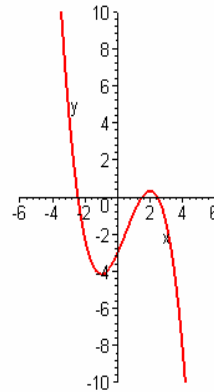
b)



c)



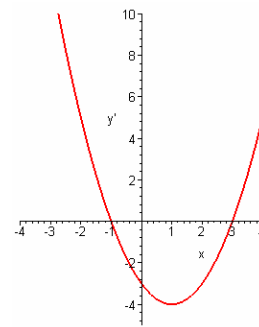
d)



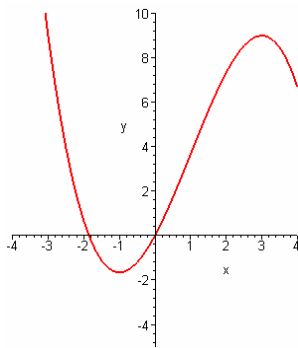
**Problem 20**

**3 Points**

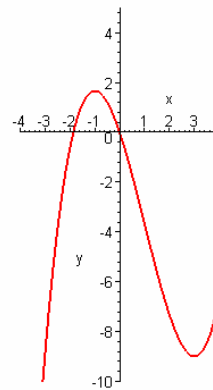
If the graph on the right is the graph of  $y' = f'(x)$ , which of the following could be the graph of  $y = f(x)$  ?



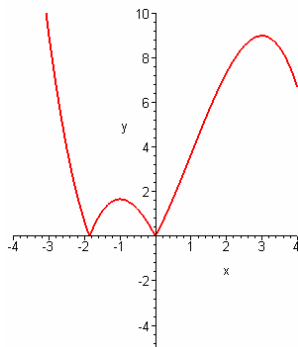
a)



b)



c)



d)

