

Exam

Name _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the domain of the given function.

1) $f(x) = \sqrt{10 - x}$

1) $(-\infty, 10]$

2) $f(x) = \frac{x}{x - 5}$

2) $(-\infty, 5) \cup (5, \infty)$

3) $f(x) = \frac{\sqrt{x+5}}{(x+7)(x-8)}$

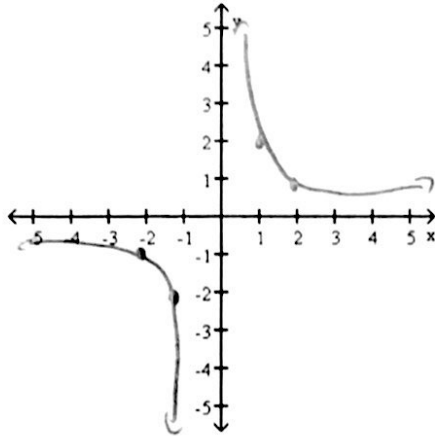
Handwritten notes: $[-5, \infty)$ with arrows pointing to the numerator and denominator. The denominator has $-7, 8$ written below it.

3) $[-5, 8) \cup (8, \infty)$

Graph the function and determine if it has a point of discontinuity at $x = 0$. If there is a discontinuity, tell whether it is removable or non-removable.

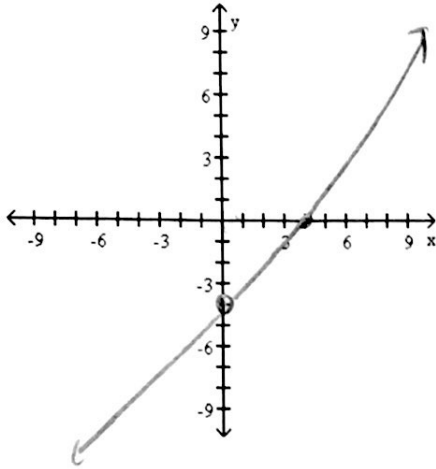
4) $f(x) = \frac{2}{x}$

4) Non-removable



5) $g(x) = \frac{x^2 - 4x}{x}$

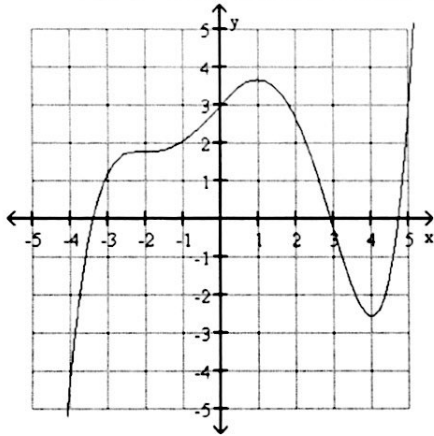
$X(X-4)$



5) Removable

Solve the problem.

6) Use the graph of f to estimate the local maximum and local minimum.

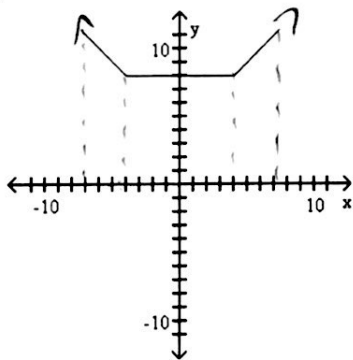


6) _____

LMax = 3.5
LMin = -2.5

Determine the intervals on which the function is increasing, decreasing, and constant.

7)

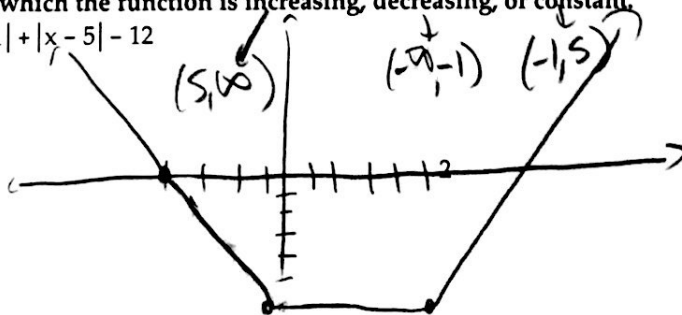


$(4, \infty)$ $(-\infty, -4)$ $(-4, 4)$

7) _____

Identify intervals on which the function is increasing, decreasing, or constant.

8) $h(x) = |x + 1| + |x - 5| - 12$



8) _____

Determine if the function is bounded above, bounded below, bounded on its domain, or unbounded on its domain.

9) $y = 1 - x^2$

9) Above

10) $y = \sqrt{7 - x^2}$

10) Bounded

11) $y = 8x - x^3$

11) unbounded

Solve the problem.

12) Determine graphically the local maximum and local minimum of $f(x) = -4x^{2/3} + 5$.

12) max (0, 5)
no min

13) Estimate graphically the local maximum and local minimum of $f(x) = \frac{1}{3}x^3 + x^2 - 3x$.

13) max (-3, 9)
min (1, -1.7)

Determine algebraically whether the function is even, odd, or neither even nor odd.

14) $f(x) = 2x^2 - 4$ $f(-x) = 2x^2 - 4$

14) even

15) $f(x) = -8x^4 - 4x - 5$ $f(-x) = -8x^4 + 4x - 5$

15) Neither

16) $f(x) = x + \frac{11}{x}$

16) odd

Find the asymptote(s) of the given function.

17) $f(x) = \frac{x - 9}{x^2 + 8}$ vertical asymptotes(s)

17) None

18) $f(x) = \frac{x - 6}{x^2 - 25}$ vertical asymptotes(s)

18) $x = 5, x = -5$

19) $f(x) = \frac{8x^2 + 5}{8x^2 - 5}$ horizontal asymptotes(s)

19) $y = 1$

20) $g(x) = \frac{x^2 + 2x - 4}{x - 4}$ horizontal asymptotes(s)

20) None, slant

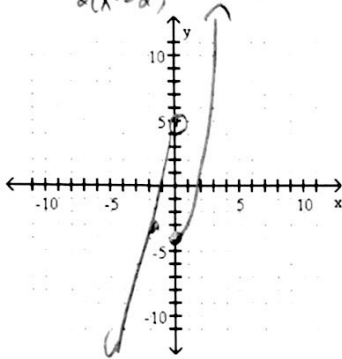
21) $g(x) = \frac{x + 2}{x^2 - 5}$ horizontal asymptotes(s)

21) $y = 0$

Graph the piecewise-defined function.

22)

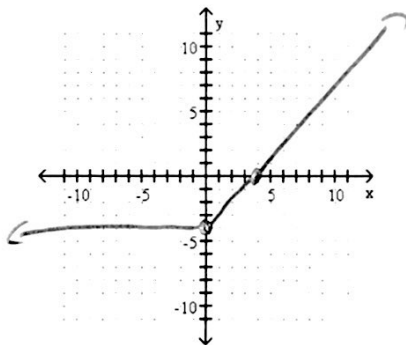
$$y(x) = \begin{cases} 8x + 5, & \text{if } x < 0 \quad (0, 5) \text{ open} \\ 2x^2 - 4, & \text{if } x \geq 0 \quad (0, -4) \text{ closed} \\ 2(x^2 - 2) \end{cases}$$



22) _____

23)

$$f(x) = \begin{cases} |x| - 4, & \text{if } x < 0 \quad (0, -4) \\ -4, & \text{if } x \geq 0 \end{cases}$$



23) _____

Perform the requested operation or operations.

24) $f(x) = \sqrt{x+6}$; $g(x) = 8x - 10$
Find $f(g(x))$.

$$\sqrt{8x-10+6} = \sqrt{8x-4}$$

$$\sqrt{4(2x-1)}$$

24) $\frac{2\sqrt{2x-1}}{}$

25) $f(x) = x^2 + 1$; $g(x) = \sqrt{x-3}$
Find $f(g(x))$.

$$(\sqrt{x-3})^2 + 1 = x-3+1$$

25) $\frac{x-2}{}$

Find functions f and g so that $h(x) = f(g(x))$.

26) $h(x) = |6x + 5|$

26) $\frac{f(x) = |x|}{g(x) = 6x+5}$

27) $h(x) = \frac{10}{\sqrt{9x+7}}$

27) $\frac{f(x) = \frac{10}{\sqrt{x}}}{g(x) = 9x+7}$

Find the inverse of the function.

28) $f(x) = x^3 + 7$

$x = y^3 + 7$

$\sqrt[3]{x-7}$

29) $f(x) = \frac{-6x + 8}{8x - 3}$

$x = \frac{-6y + 8}{8y - 3}$

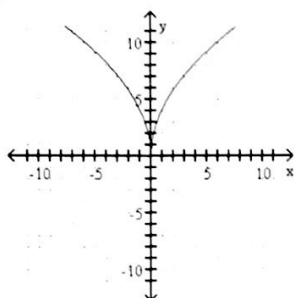
$8xy - 3x = -6y + 8$

$8xy + 6y = 3x + 8$

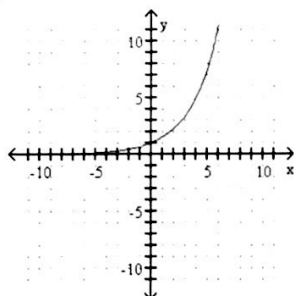
$y(8x + 6) = 3x + 8$

Determine if the function is one-to-one.

30)



31)



28) _____

$f(x) = \frac{3x+8}{8x+6}$

29) _____

30) NO

Horiz. line test

31) yes

Chapter 9 Review

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write the series using summation notation.

1) $9 - 27 + 81 - 243 + \dots$

A) $\sum_{n=0}^{\infty} 9 \cdot 3^n$

B) $\sum_{n=0}^{\infty} 9(-3)^n$

C) $\sum_{n=0}^{\infty} 9(-3)^{n+1}$

D) $\sum_{n=0}^{\infty} 9 \cdot 3^{n+1}$

1) B.

2) $-5 + 5 + 15 + 25 + \dots + 145$

A) $\sum_{n=0}^{15} (-5 + n \cdot 10)$

B) $\sum_{n=0}^{\infty} -50n$

D) $\sum_{n=0}^{\infty} (-5 + n \cdot 10)$

2) A.

Find the sum of the arithmetic series.

3) $13 + 15 + 17 + 19 + \dots + 31$

A) 139

B) 120

C) 220

D) 33

3) C.

Determine whether the infinite geometric series converges. If the series converges, determine the limit.

4) $5 + 10 + 20 + 40 + \dots$

A) Converges; 35

B) Diverges

C) Converges; 155

D) Converges; 75

4) B.

5) $36 + 6 + 1 + \frac{1}{6} + \dots$

A) Diverges

B) Converges; $\frac{216}{7}$

C) Converges; $\frac{216}{5}$

D) Converges; -9324

5) C.

Chapter 8 Review

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the vertex, focus, directrix, and focal width of the parabola.

- 1) $(y - 3)^2 = 4(x - 7)$
 A) Vertex: (7, 3); Focus: (11, 3); Directrix: $x = 3$; Focal width: 4
 B) Vertex: (3, 7); Focus: (3, 11); Directrix: $y = 3$; Focal width: 4
 C) Vertex: (3, 7); Focus: (3, 8); Directrix: $y = 6$; Focal width: 1
 D) Vertex: (7, 3); Focus: (8, 3); Directrix: $x = 6$; Focal width: 4

1) D.

Find the standard form of the equation of the parabola.

- 2) Focus at (10, -4), directrix $y = -6$
 A) $(y + 4)^2 = 4(x - 10)$
 B) $(x - 10)^2 = 4(y + 4)$
 C) $(x - 10)^2 = 4(y + 5)$
 D) $(x + 4)^2 = 4(y + 5)$

2) C.

Find the vertex, the focus, and the directrix of the parabola.

- 3) $x^2 + 10x + 8y + 17 = 0$
 A) Vertex: $(-5, 1)$; Focus: $(-5, -1)$; Directrix: $y = 3$
 B) Vertex: $(-5, \frac{7}{8})$; Focus: $(-5, -7)$; Directrix: $y = \frac{9}{8}$
 C) Vertex: $(-5, -6)$; Focus: $(-5, -7)$; Directrix: $y = -9$
 D) Vertex: $(-5, -1)$; Focus: $(-5, 3)$; Directrix: $y = -1$

3) A.

Find an equation in standard form for the ellipse that satisfies the given conditions.

- 4) An ellipse with foci at (1, -1) and (7, -1); major axis length of 10
 A) $\frac{(y + 1)^2}{25} + \frac{(x - 4)^2}{16} = 1$
 B) $\frac{(x - 1)^2}{25} + \frac{(x + 4)^2}{16} = 1$
 C) $\frac{(x - 4)^2}{25} + \frac{(y + 1)^2}{16} = 1$
 D) $\frac{(x + 1)^2}{25} + \frac{(y + 4)^2}{16} = 1$

4) C.

Find the center, vertices, and foci of the ellipse with the given equation.

- 5) $7x^2 + 3y^2 = 21$
 A) Center: (0, 0); Vertices: $(-7, 0), (7, 0)$; Foci: $(-2\sqrt{10}, 0), (2\sqrt{10}, 0)$
 B) Center: (0, 0); Vertices: $(0, -7), (0, 7)$; Foci: $(0, -2\sqrt{10}), (0, 2\sqrt{10})$
 C) Center: (0, 0); Vertices: $(-\sqrt{7}, 0), (\sqrt{7}, 0)$; Foci: $(-2, 0), (2, 0)$
 D) Center: (0, 0); Vertices: $(0, -\sqrt{7}), (0, \sqrt{7})$; Foci: $(0, -2), (0, 2)$

5) D.

Find the vertices and foci of the hyperbola.

- 6) $\frac{(y + 1)^2}{36} - \frac{(x + 2)^2}{64} = 1$
 A) Vertices: (5, -2), (-7, -2); Foci: (9, -2), (-11, -2)
 B) Vertices: (7, -2), (-9, -2); Foci: (-9, -2), (7, -2)
 C) Vertices: (-2, 7), (-2, -9); Foci: (-2, 9), (-2, -7)
 D) Vertices: (-2, 5), (-2, -7); Foci: (-2, 9), (-2, -11)

6) D.

Midterm Review Matrices

Simplify. Write "undefined" for expressions that are undefined.

1) $\begin{bmatrix} -6 & -4 & -6 \\ 0 & 1 & 1 \end{bmatrix} - [-6 \quad -4 \quad 2 \quad -4]$ undef.

Evaluate each determinant.

2) $\begin{vmatrix} 5 & 1 \\ -3 & 3 \end{vmatrix}$ 18

3) $\begin{vmatrix} -5 & 1 & -1 \\ -5 & -4 & 1 \\ 0 & -5 & 2 \end{vmatrix}$ 0

Solve each equation or state if there is no unique solution.

4) $\begin{bmatrix} 26 & 23 \\ 24 & 20 \end{bmatrix} = \begin{bmatrix} 8 & 9 \\ 7 & 8 \end{bmatrix} X$ $\begin{bmatrix} -8 & 4 \\ 10 & -1 \end{bmatrix}$

Find the inverse of each matrix.

5) $\begin{bmatrix} 0 & 5 \\ -3 & 9 \end{bmatrix}$ $\frac{1}{15} \begin{bmatrix} 9 & -5 \\ 3 & 0 \end{bmatrix}$

Simplify. Write "undefined" for expressions that are undefined.

6) $\begin{bmatrix} -1 & -1 \\ -6 & 5 \end{bmatrix} \cdot \begin{bmatrix} -6 & -5 & -4 \\ 1 & -5 & -1 \end{bmatrix}$

$\begin{bmatrix} 5 & 10 & 5 \\ 41 & 5 & 19 \end{bmatrix}$

7) $\begin{bmatrix} -2 & -2 \\ 2 & 3 \\ -1 & -4 \end{bmatrix} \cdot \begin{bmatrix} 4 & -1 \\ -3 & -4 \end{bmatrix}$

$\begin{bmatrix} -2 & 10 \\ -1 & -14 \\ 8 & 17 \end{bmatrix}$

Solve each system using matrices

8) $\begin{cases} 4r + 3s + 3t = 9 \\ 6r - s - 5t = 9 \\ 3r - 4s - 3t = -15 \end{cases}$

$(0, 6, -3)$