PRECALCULUS
MIDTERM REVIEW

CHAPTERS ~~XXXXX~~ 1-5

You will be expected to complete all problems in this packet to be properly prepared for your midterm exam. After completing the selected problems in each chapter, you should check your answers (answers are attached at the end of this packet). Questions incorrectly completed should be corrected by referring to the appropriate chapter in your book and notes.

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Solve the equation algebraically. Verify the solution using a graphing utility.

1) $\sqrt{x+1} = 8$

    A) {63}   B) {64}   C) {81}   D) {65}

1) _____

Solve the problem.

2) If (–4, 1) is the endpoint of a line segment, and (–3, –3) is its midpoint, find the other endpoint.

    A) (–2, –7)   B) (–12, 3)   C) (–6, 9)   D) (–2, 5)

2) _____

3) Find an equation of the line with slope undefined and containing the point $(-\frac{1}{7}, 9)$.

    A) $y = 9$ B) $x = -\frac{1}{7}$ C) $y = -\frac{1}{7}$ D) $x = 9$

3) _____

4) If (a, 3) is a point on the graph of $y = 2x - 5$, what is a?

    A) 1   B) 4   C) –4   D) –1

4) _____

5) Find the length of each side of the triangle determined by the three points P_1, P_2, and P_3. State whether the triangle is an isosceles triangle, a right triangle, neither of these, or both.
$P_1 = (-5, -4)$, $P_2 = (-3, 4)$, $P_3 = (0, -1)$

    A) $d(P_1, P_2) = 2\sqrt{17}$; $d(P_2, P_3) = \sqrt{34}$; $d(P_1, P_3) = \sqrt{34}$
        isosceles triangle

    B) $d(P_1, P_2) = 2\sqrt{17}$; $d(P_2, P_3) = \sqrt{34}$; $d(P_1, P_3) = 5\sqrt{2}$
        neither

    C) $d(P_1, P_2) = 2\sqrt{17}$; $d(P_2, P_3) = \sqrt{34}$; $d(P_1, P_3) = \sqrt{34}$
        both

    D) $d(P_1, P_2) = 2\sqrt{17}$; $d(P_2, P_3) = \sqrt{34}$; $d(P_1, P_3) = 5\sqrt{2}$
        right triangle

5) _____

6) A truck rental company rents a moving truck one day by charging $29 plus $0.13 per mile. Write a linear equation that relates the cost C, in dollars, of renting the truck to the number x of miles driven. What is the cost of renting the truck if the truck is driven 110 miles?

    A) $C = 0.13x - 29$; $14.70
    C) $C = 0.13x + 29$; $30.43

    B) $C = 29x + 0.13$; $3190.13
    D) $C = 0.13x + 29$; $43.30

6) _____

Find the general form of the equation of the the circle.

7) Center at the point (–4, –3); containing the point (–3, 3)

    A) $x^2 + y^2 - 6x + 6y - 12 = 0$
    C) $x^2 + y^2 + 6x - 6y - 17 = 0$

    B) $x^2 + y^2 + 8x + 6y - 12 = 0$
    D) $x^2 + y^2 + 6x + 8y - 17 = 0$

7) _____

Name the quadrant in which the point is located.

8) (2, –14)

    A) I   B) II   C) III   D) IV

8) _____

Find the slope of the line containing the two points.

9) $(-4, -6)$; $(-4, -9)$

   A) 0   B) $\frac{1}{3}$ C) -3 D) undefined

Find the slope and y-intercept of the line.

10) $-\frac{1}{9}y = x - 7$

10) _____

   A) slope $= -\frac{1}{9}$; y-intercept $= -7$ B) slope $= 9$; y-intercept $= 63$

   C) slope $= -9$; y-intercept $= -7$ D) slope $= -9$; y-intercept $= 63$

Find an equation for the line with the given properties. Express the answer using the slope-intercept form of the equation of a line.

11) Perpendicular to the line $x - 7y = 7$; containing the point $(2, 2)$

11) _____

12) Containing the points $(-3, 4)$ and $(4, -8)$

12) _____

13) horizontal; containing the point $(-\frac{2}{7}, 7)$

13) _____

14) Parallel to the line $y = -3x$; containing the point $(5, 5)$

14) _____

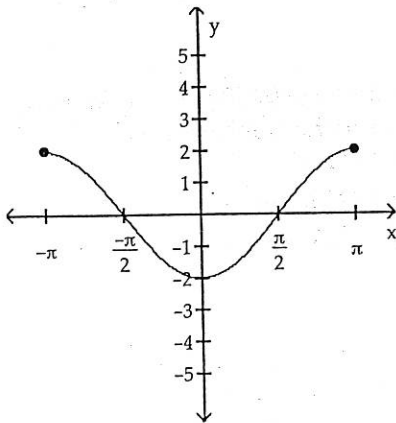List the intercepts for the graph of the equation.

15) $y^2 - x - 4 = 0$

15) _____

List the intercepts of the graph.

16)

16)

Graph the equation using a graphing utility. Use a graphing utility to approximate the intercepts rounded to two decimal places, if necessary. Use the TABLE feature to help establish the viewing window.

17) $3x^2 - 5y = 34$

17) _____

Use a graphing utility to approximate the real solutions, if any, of the equation rounded to two decimal places.

18) $2x^4 - 5x^2 + 7x = 14$

18) _____

Solve the equation algebraically. Verify the solution using a graphing utility.

19) $\dfrac{2x+7}{5} + \dfrac{3x}{4} = -\dfrac{8}{5}$

19) _____

Find the midpoint of the line segment joining the points P_1 and P_2.

20) $P_1 = (-7, 1);\ P_2 = (9, 3)$

20) _____

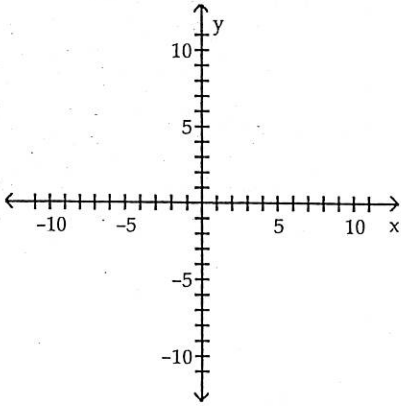Find the distance $d(P_1, P_2)$ between the points P_1 and P_2.

21) $P_1 = (5, 5);\ P_2 = (5, -1)$

21) _____

Graph the line containing the point P and having slope m.

22) $P = (2, 0);\ m = -\dfrac{1}{2}$

22)

Find the center (h, k) and radius r of the circle.

23) $3(x+5)^2 + 3(y-3)^2 = 27$

23) _____

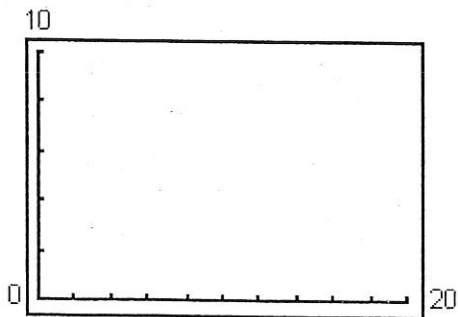Write the standard form of the equation of the circle with radius r and center (h, k).

24) $r = \sqrt{3};\ (h, k) = (-4, 3)$

24) _____

Determine the viewing window used.

25)

25) _____

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Find the value for the function.

1) Find $f(x-1)$ when $f(x) = 3x^2 + 2x - 7$.

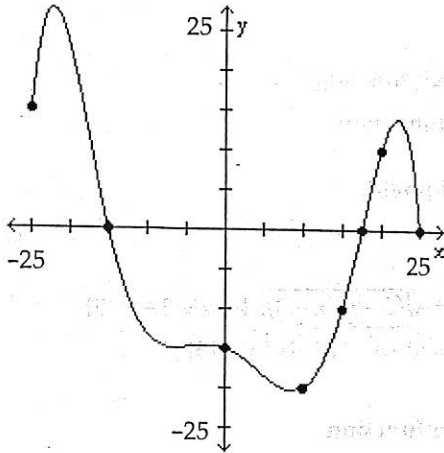   A) $3x^2 - 4x - 6$ B) $-4x^2 + 3x - 6$ C) $3x^2 - 19x - 2$ D) $3x^2 - 4x - 2$

1) _____

The graph of a function f is given. Use the graph to answer the question.

2) For what numbers x is $f(x) > 0$?

2) _____

    A) $[-25, -15), (17.5, 25)$ B) $(-\infty -15)$

    C) $(-15, \infty)$ D) $(-15, 17.5)$

Use a graphing utility to find the equation of the line of best fit.

3)

x	2	4	5	6
y	7	11	13	20

3) _____

    A) $y = 2.8x + 0.15$ B) $y = 2.8x$ C) $y = 3.0x$ D) $y = 3.0x + 0.15$

Use a graphing utility to graph the function over the indicated interval and approximate any local maxima and local minima. Determine where the function is increasing and where it is decreasing. If necessary, round answers to two decimal places.

4) $f(x) = x^3 - 3x + 1; (-2, 2)$

4) _____

    A) local maximum at $(1, -1)$
        local minimum at $(-1, 3)$
        increasing on $(-2, -1)$
        decreasing on $(-1, 1)$

    B) local maximum at $(1, -1)$
        local minimum at $(-1, 3)$
        increasing on $(-2, -1)$ and $(1, 2)$
        decreasing on $(-1, 1)$

    C) local maximum at $(-1, 3)$
        local minimum at $(1, -1)$
        increasing on $(-1, 1)$
        decreasing on $(-2, -1)$ and $(1, 2)$

    D) local maximum at $(-1, 3)$
        local minimum at $(1, -1)$
        increasing on $(-2, -1)$ and $(1, 2)$
        decreasing on $(-1, 1)$

Solve the problem.

5) A wire of length 8x is bent into the shape of a square. Express the area A of the square as a function of x.

5) _____

    A) $A(x) = 8x^2$ B) $A(x) = \frac{1}{16}x^2$ C) $A(x) = 4x^2$ D) $A(x) = 2x^2$

Match the graph to the function listed whose graph most resembles the one given.

6)

A) cube function

B) square root function

C) square function

D) cube root function

For the given functions f and g, find the requested function and state its domain.

7) $f(x) = \sqrt{5 - x}$; $g(x) = \sqrt{x - 3}$

7) _____

Find $f \cdot g$.

A) $(f \cdot g)(x) = \sqrt{(5 - x)(x - 3)}$; $\{x \mid x \geq 0\}$

B) $(f \cdot g)(x) = \sqrt{(5 - x)(x - 3)}$; $\{x \mid x \neq 3, x \neq 5\}$

C) $(f \cdot g)(x) = \sqrt{(5 - x)(x - 3)}$; $\{x \mid 3 \leq x \leq 5\}$

D) $(f \cdot g)(x) = \sqrt{-x^2 - 15}$; $\{x \mid x \neq 15\}$

Find and simplify the difference quotient of f, $\dfrac{f(x + h) - f(x)}{h}$, $h \neq 0$, for the function.

8) $f(x) = 8x + 1$

8) _____

A) $8 + \dfrac{16(x + 1)}{h}$

B) 0

C) $8 + \dfrac{2}{h}$

D) 8

Find the average rate of change for the function between the given values.

9) $f(x) = \dfrac{3}{x - 2}$; from 4 to 7

9) _____

A) $\dfrac{1}{3}$

B) 7

C) $-\dfrac{3}{10}$

D) 2

Find the function.

10) Find the function that is finally graphed after the following transformations are applied to the graph of $y = |x|$. The graph is shifted right 3 units, stretched by a factor of 3, shifted vertically down 2 units, and finally reflected across the x-axis.

10) _____

A) $y = -3|x - 3| - 2$

B) $y = 3|-x - 3| - 2$

C) $y = -(3|x - 3| - 2)$

D) $y = -(3|x + 3| - 2)$

Determine whether the relation represents a function. If it is a function, state the domain and range.

11) $\{(-2, 6), (-1, 3), (0, 2), (1, 3), (3, 11)\}$

11) _____

Solve the problem.

12) The price p and x, the quantity of a certain product sold, obey the demand equation

12) _____

$p = -\dfrac{1}{10}x + 100$, $\{x \mid 0 \leq x \leq 1000\}$

a) Express the revenue R as a function of x.

b) What is the revenue if 450 units are sold?

c) Graph the revenue function using a graphing utility.

d) What quantity ... even ... What is the maximum revenue?

e) What price shou... n ... maximize revenue?

2

13) If a rock falls from a height of 60 meters on Earth, the height H (in meters) after x seconds is   13) _____
approximately

$$H(x) = 60 - 4.9x^2.$$

When does the rock strike the ground? Round to the nearest hundredth, if necessary.

14) The cost C, in dollars, to produce graphing calculators is given by the function $C(x) = 53x + 3500$, where x is the number of calculators produced. What is the cost to produce 2900 calculators?

14) _____

Find the domain of the function.

15) $h(x) = \dfrac{x - 2}{x^3 - 64x}$

15) _____

16) $f(x) = \sqrt{3 - x}$

16) _____

For the given functions f and g, find the requested function and state its domain.

17) $f(x) = 2x + 3$; $g(x) = 5x - 2$

Find $\dfrac{f}{g}$.

17) _____

Answer the question about the given function.

18) Given the function $f(x) = \dfrac{x^2 - 5}{x - 3}$, is the point $(2, -9)$ on the graph of f?

18) _____

The graph of a function is given. Determine whether the function is increasing, decreasing, or constant on the given interval.

19) $(0.5, 3.5)$

19)
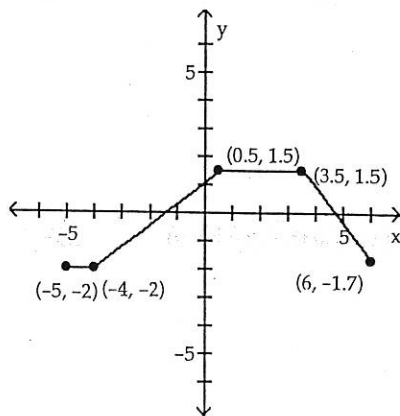
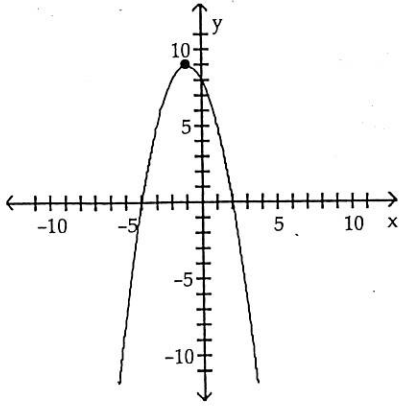**Determine algebraically whether the function is even, odd, or neither.**

20) $f(x) = \dfrac{1}{x^2}$

20) _____

21) $f(x) = \dfrac{x}{x^2 + 4}$

21) _____

Determine whether the graph is that of a function. If it is, use the graph to find its domain and range, the intercepts, if any, and any symmetry with respect to the x-axis, the y-axis, or the origin.
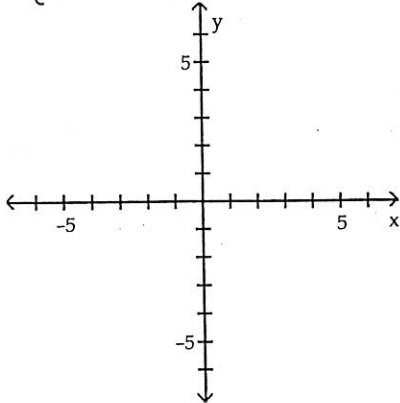
22)

Graph the function.

23)

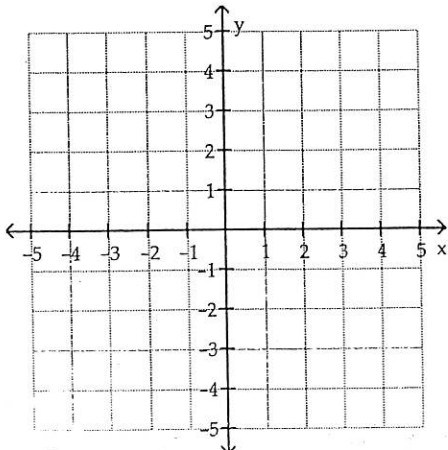$$f(x) = \begin{cases} x+1 & \text{if } x < 1 \\ -3 & \text{if } x \geq 1 \end{cases}$$

Provide an appropriate answer.

24) Complete the square of the given quadratic function. Then, graph the function by hand using the technique of shifting.
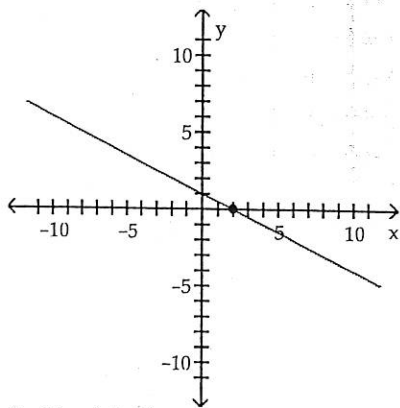
$$f(x) = x^2 + 6x + 7$$

1) A
2) A
3) B
4) B
5) C
6) D
7) B
8) D
9) D
10) D
11) $y = -7x + 16$
12) $y = -\dfrac{12}{7}x - \dfrac{8}{7}$
13) $y = 7$
14) $y = -3x + 20$
15) $(0, -2), (-4, 0), (0, 2)$
16) $(-\dfrac{\pi}{2}, 0), (0, -2), (\dfrac{\pi}{2}, 0)$
17) $(0, -6.8), (-3.37, 0), (3.37, 0)$
18) $\{-2.31, 1.69\}$
19) $\{-\dfrac{60}{23}\}$
20) $(1, 2)$
21) 6
22)

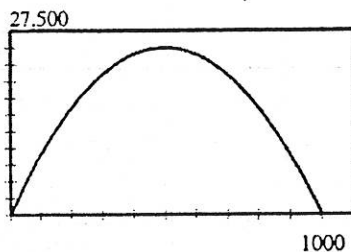23) $(h, k) = (-5, 3); \ r = 3$
24) $(x + 4)^2 + (y - 3)^2 = 3$
25)

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WINDOW
  Xmin=0
  Xmax=20
  Xscl=2
  Ymin=0
  Ymax=10
  Yscl=2
  Xres=1
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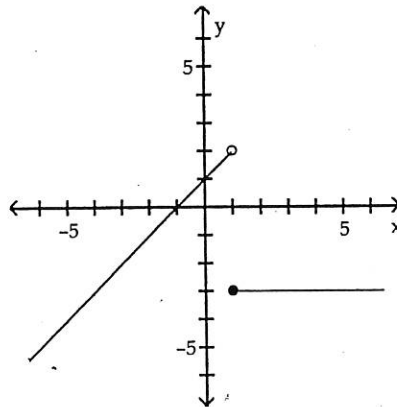
1) A
2) A
3) C
4) D
5) C
6) A
7) C
8) D
9) C
10) C
11) function
   domain: $\{-2, -1, 0, 1, 3\}$
   range: $\{6, 3, 2, 11\}$

12) a. $R(x) = -\dfrac{1}{10}x^2 + 100x$

   b. $R(450) = \$24{,}750.00$

   c.

   d. 500; $25,000.00
   e. $50.00

13) 3.5 sec
14) $157,200
15) $\{x \mid x \neq -8, 0, 8\}$
16) $\{x \mid x \leq 3\}$

17) $(\dfrac{f}{g})(x) = \dfrac{2x + 3}{5x - 2};\ \{x \mid x \neq \dfrac{2}{5}\}$

18) No
19) constant
20) even
21) odd
22) function
   domain: all real numbers
   range: $\{y \mid y \leq 9\}$
   intercepts: $(-4, 0), (0, 8), (2, 0)$
   symmetry: none

23)

24)