

MATH 109 College Algebra
 Final Examination
 Spring 2008

Name _____

Professor: _____

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

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

1) $P_1 = (6, 4); P_2 = (-6, -3)$

1) _____

A) $\sqrt{193}$

B) 84

C) 5

D) $\sqrt{95}$

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

2) $P_1 = (9, -8); P_2 = (-3, -5)$

2) _____

A) $(6, -\frac{3}{2})$

B) (12, -3)

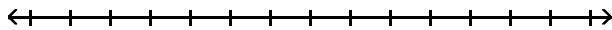
C) $(3, -\frac{13}{2})$

D) (6, -13)

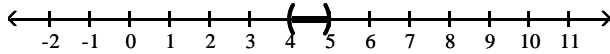
Solve the inequality. Express your answer using interval notation. Graph the solution set.

3) $-20 \leq -3x - 5 \leq -17$

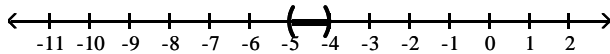
3) _____



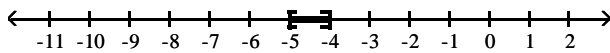
A) (4, 5)



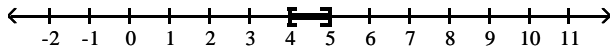
B) (-5, -4)



C) [-5, -4]

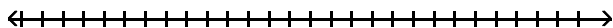


D) [4, 5]

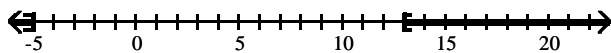


4) $|x - 4| - 5 \geq 4$

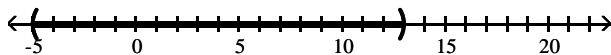
4) _____



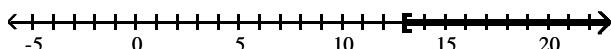
A) $(-\infty, -5] \cup [13, \infty)$



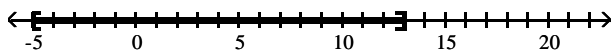
B) $(-5, 13)$



C) $[13, \infty)$



D) $[-5, 13]$



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

5) Parallel to the line $-2x - y = 7$; containing the point $(0, 0)$

5) _____

A) $y = \frac{1}{2}x$

B) $y = \frac{1}{2}x + 7$

C) $y = -\frac{1}{2}x$

D) $y = -2x$

6) Perpendicular to the line $y = 2x + 4$; containing the point $(-1, -1)$

6) _____

A) $y = 2x - \frac{3}{2}$

B) $y = -\frac{1}{2}x - \frac{3}{2}$

C) $y = \frac{1}{2}x - \frac{3}{2}$

D) $y = -2x - \frac{3}{2}$

Determine whether the function is symmetric with respect to the y-axis, symmetric with respect to the x-axis, symmetric with respect to the origin, or none of these.

7) $y = -6x^3 + 7x$

7) _____

A) origin only

B) y-axis only

C) x-axis only

D) x-axis, y-axis, origin

Find the value for the function.

8) Find $f(2)$ when $f(x) = \frac{x^2 - 4}{x + 3}$.

8) _____

A) 0

B) $\frac{8}{5}$

C) 2

D) $\frac{4}{5}$

Find the domain of the function.

9) $\frac{x}{\sqrt{x-10}}$

9) _____

A) $\{x \mid x > 10\}$

B) $\{x \mid x \neq 10\}$

C) $\{x \mid x \geq 10\}$

D) all real numbers

For the given functions f and g , find the requested composite function value.

10) $f(x) = \sqrt{x+4}$; $g(x) = 5x$; Find $(f \circ g)(2)$.

10) _____

A) $5\sqrt{30}$

B) $5\sqrt{6}$

C) $\sqrt{14}$

D) $\sqrt{30}$

The function f is one-to-one. Find its inverse.

11) $f(x) = \sqrt[3]{x+4}$

11) _____

A) $f^{-1}(x) = x^3 - 4$

B) $f^{-1}(x) = x - 4$

C) $f^{-1}(x) = \frac{1}{x^3 - 4}$

D) $f^{-1}(x) = x^3 + 16$

Write the expression in the standard form $a + bi$.

12) $(4 + 8i)(2 - 5i)$

12) _____

A) $-32 + 36i$

B) $-40i^2 - 4i + 8$

C) $48 + 4i$

D) $48 - 4i$

13) $\frac{3}{1 + 8i}$

13) _____

A) $\frac{3}{65} - \frac{24}{65}i$

B) $-\frac{1}{21} + \frac{8}{21}i$

C) $-\frac{1}{21} - \frac{8}{21}i$

D) $\frac{3}{65} + \frac{24}{65}i$

Solve the equation in the complex number system.

14) $x^2 + x + 9 = 0$

14) _____

A) $\left\{\frac{1 - \sqrt{35}}{2}, \frac{1 + \sqrt{35}}{2}\right\}$

B) $\left\{\frac{1}{2} - \frac{\sqrt{35}}{2}i, \frac{1}{2} + \frac{\sqrt{35}}{2}i\right\}$

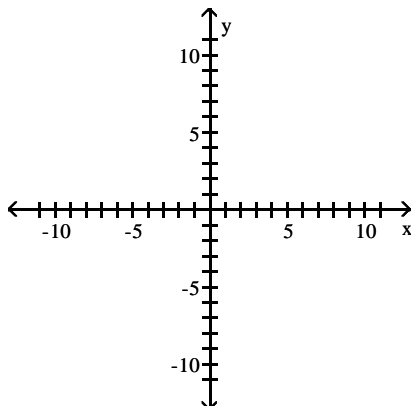
C) $\left\{\frac{-1 - \sqrt{35}}{2}, \frac{-1 + \sqrt{35}}{2}\right\}$

D) $\left\{-\frac{1}{2} - \frac{\sqrt{35}}{2}i, -\frac{1}{2} + \frac{\sqrt{35}}{2}i\right\}$

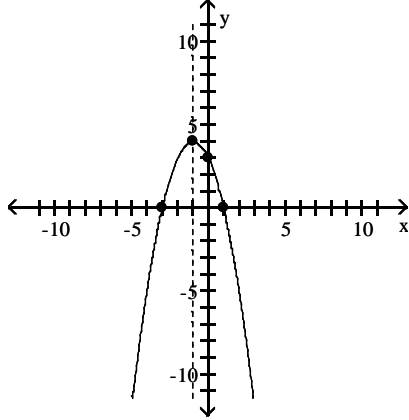
Graph the function using its vertex, axis of symmetry, and intercepts.

15) $f(x) = x^2 + 2x - 3$

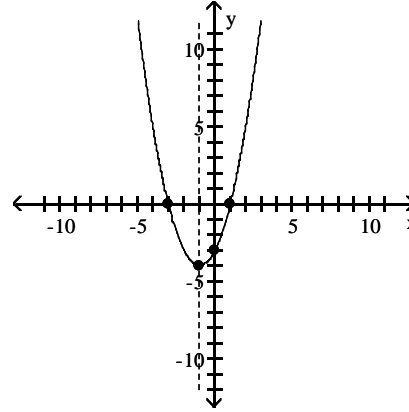
15) _____



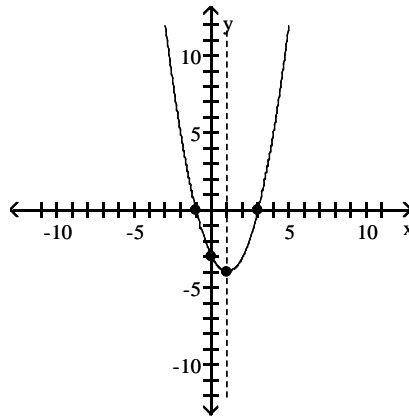
- A) vertex $(-1, 4)$
intercepts $(1, 0), (-3, 0), (0, 3)$



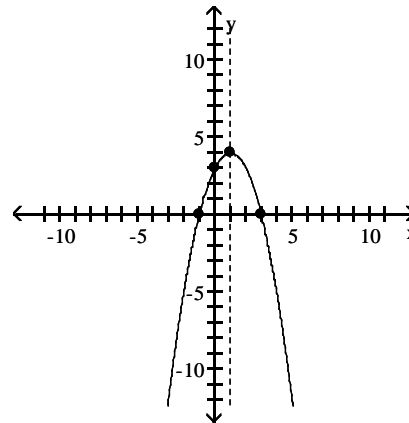
- B) vertex $(-1, -4)$
intercepts $(1, 0), (-3, 0), (0, -3)$



- C) vertex $(1, -4)$
intercepts $(-1, 0), (3, 0), (0, -3)$



- D) vertex $(1, 4)$
intercepts $(-1, 0), (3, 0), (0, 3)$



Find the function.

- 16) 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.

16) _____

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

Find all of the real zeros of the polynomial function, then use the real zeros to factor f over the real numbers.

17) $f(x) = x^3 + 2x^2 - 9x - 18$

17) _____

- A) -2 ; $f(x) = (x + 2)(x^2 + x - 9)$ B) -3 ; $f(x) = (x + 3)(x^2 - x - 6)$
C) $-3, 2, 3$; $f(x) = (x + 3)(x - 2)(x - 3)$ D) $-3, -2, 3$; $f(x) = (x + 3)(x + 2)(x - 3)$

Solve the equation.

18) $8^{3x - 5} = 16^{2x}$

18) _____

- A) $\left\{-\frac{1}{15}\right\}$ B) $\{15\}$ C) $\left\{\frac{1}{15}\right\}$ D) $\{-15\}$

19) $\log(5 + x) - \log(x - 3) = \log 5$

A) $\left\{\frac{3}{2}\right\}$

B) \emptyset

C) $\{5\}$

D) $\{-5\}$

19) _____

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

20) $r = 9; (h, k) = (-1, 6)$

A) $x^2 + y^2 - 2x - 12y - 44 = 0$

B) $x^2 + y^2 - 2x + 12y - 44 = 0$

C) $x^2 + y^2 + 2x - 12y - 44 = 0$

D) $x^2 + y^2 + 2x + 12y - 44 = 0$

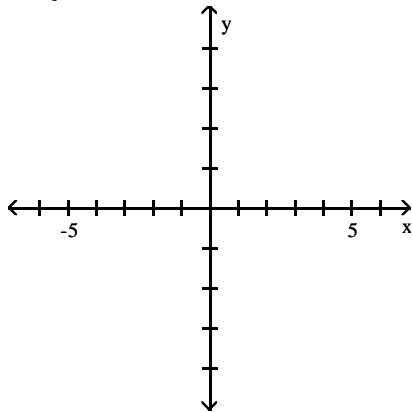
20) _____

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

Graph the function.

21)

$$f(x) = \begin{cases} -x + 2 & x < 0 \\ \sqrt{x} + 3 & x \geq 0 \end{cases}$$



21) _____

Use the given zero to find the remaining zeros of the function.

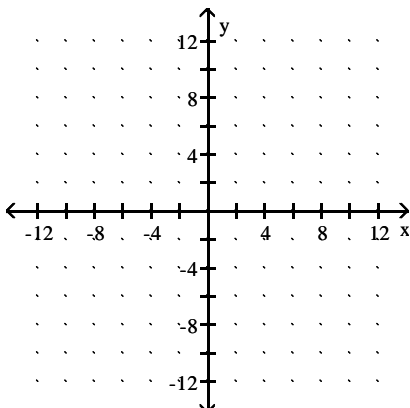
22) $f(x) = x^3 - 2x^2 - 11x + 52$; zero: -4

22) _____

Graph the function.

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

23) _____



Solve the problem.

- 24) Consider the quadratic model $h(t) = -16t^2 + 40t + 50$ for the height (in feet), h , of an object t seconds after the object has been projected straight up into the air. Find the maximum height attained by the object. How much time does it take to fall back to the ground? Assume that it takes the same time for going up and coming down. 24) _____
- 25) How much pure acid should be mixed with 2 gallons of a 50% acid solution in order to get an 80% acid solution? 25) _____

Answer Key

Testname: DRAFT MATH 109 S08

- 1) A
ID: ATEGU4 1.1.1-1
Diff: 0
Objective: (1.1) Use the Distance Formula
- 2) C
ID: ATEGU4 1.1.2-2
Diff: 0
Objective: (1.1) Use the Midpoint Formula
- 3) D
ID: ATEGU4 1.7.4-5
Diff: 0
Objective: (1.7) Solve Combined Inequalities Algebraically and Graphically
- 4) A
ID: ATEGU4 1.7.5-12
Diff: 0
Objective: (1.7) Solve Absolute Value Inequalities Algebraically and Graphically
- 5) D
ID: ATEGU4 1.8.9-4
Diff: 0
Objective: (1.8) Find Equations of Parallel Lines
- 6) B
ID: ATEGU4 1.8.10-2
Diff: 0
Objective: (1.8) Find Equations of Perpendicular Lines
- 7) A
ID: ATEGU4 2.1.1-8
Diff: 0
Objective: (2.1) Test an Equation for Symmetry with respect to (a) the x-Axis, (b) the y-Axis, and (c) the Origin
- 8) A
ID: ATEGU4 2.2.2-2
Diff: 0
Objective: (2.2) Find the Value of a Function
- 9) A
ID: ATEGU4 2.2.3-7
Diff: 0
Objective: (2.2) Find the Domain of a Function
- 10) C
ID: ATEGU4 4.1.1-1
Diff: 0
Objective: (4.1) Form a Composite Function
- 11) A
ID: ATEGU4 4.2.4-5
Diff: 0
Objective: (4.2) Find the Inverse of a Function Defined by an Equation
- 12) D
ID: ATEGU4 1.4.1-4
Diff: 0
Objective: (1.4) Add, Subtract, Multiply, and Divide Complex Numbers

Answer Key

Testname: DRAFT MATH 109 S08

13) A

ID: ATEGU4 1.4.1-8

Diff: 0

Objective: (1.4) Add, Subtract, Multiply, and Divide Complex Numbers

14) D

ID: ATEGU4 1.4.2-3

Diff: 0

Objective: (1.4) Solve Quadratic Equations with a Negative Discriminant

15) B

ID: ATEGU4 3.1.3-4

Diff: 0

Objective: (3.1) Graph a Quadratic Function Using Its Vertex, Axis and Intercepts

16) D

ID: ATEGU4 2.7.4-8

Diff: 0

Objective: (2.7) Demonstrate Additional Understanding and Skills: Function Shifts, Compressions, and Reflections

17) D

ID: ATEGU4 3.6.3-1

Diff: 0

Objective: (3.6) Find the Real Zeros of a Polynomial Function

18) B

ID: ATEGU4 4.3.4-11

Diff: 0

Objective: (4.3) Solve Exponential Equations

19) C

ID: ATEGU4 4.6.1-5

Diff: 0

Objective: (4.6) Solve Logarithmic Equations Using the Properties of Logarithms

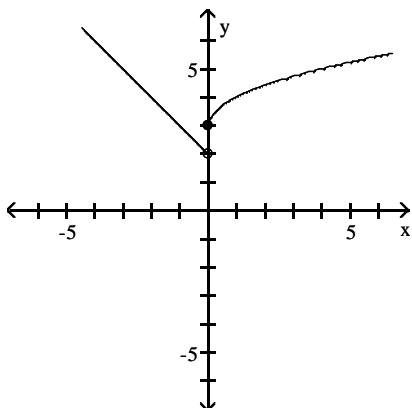
20) C

ID: ATEGU4 1.9.3-1

Diff: 0

Objective: (1.9) Work with the General Form of the Equation of a Circle

21)



ID: ATEGU4 2.6.2-3+

Diff: 0

Objective: (2.6) Graph Piecewise-Defined Functions

Answer Key

Testname: DRAFT MATH 109 S08

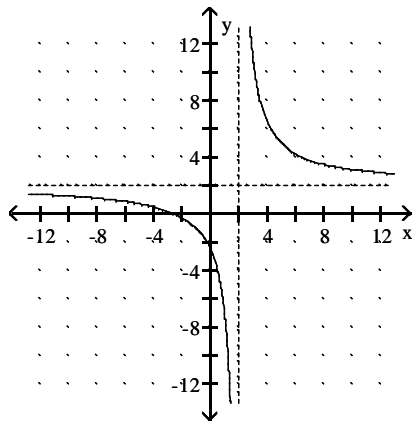
22) $3 + 2i, 3 - 2i$

ID: ATEGU4 3.7.3-3+

Diff: 0

Objective: (3.7) Find the Complex Zeros of a Polynomial

23)



ID: ATEGU4 3.4.1-37+

Diff: 0

Objective: (3.4) Analyze the Graph of a Rational Function

24) maximum height = 75 ft; time to reach ground = 2.5 seconds

ID: ATEGU4 3.1.4-23+

Diff: 0

Objective: (3.1) Use the Maximum or Minimum of a Quadratic Function to Solve Applied Problems

25) 3 gal

ID: ATEGU4 1.6.3-5+

Diff: 0

Objective: (1.6) Solve Mixture Problems