Math 1010 Final Exam
Form E, Fall 2007

Name: _____

Instructor: _____   ID verification: _____

Each problem is equally weighted. Scientific calculators are permitted.
Time limit: Two hours.
Not allowed: notes, books, graphing/programable calculators.

_____

Write as a logarithmic equation.

1) $4^{-3} = \dfrac{1}{64}$

  A) $\log_{-3} \dfrac{1}{64} = 4$ B) $\log_4 -3 = \dfrac{1}{64}$ C) $\log_{1/64} 4 = -3$ D) $\log_4 \dfrac{1}{64} = -3$

Find an equation of the line. Write the equation in standard form.

2) Through (4, –3) and (7, –9)

  A) $-2x + y = 5$ B) $x - 2y = 5$ C) $2x + y = 5$ D) $x + 2y = 5$

Perform the indicated operation. Write the result in the form a + bi.

3) $\dfrac{7 + 2i}{3 - 2i}$

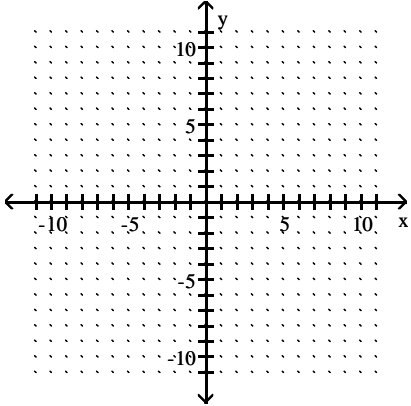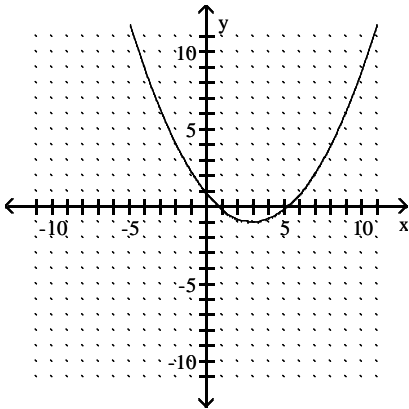 A) $\dfrac{25}{13} + \dfrac{8}{13}i$ B) $\dfrac{17}{13} + \dfrac{20}{13}i$ C) $5 - 4i$ D) $\dfrac{17}{5} - 4i$

Sketch the graph of the quadratic function. Give the vertex and axis of symmetry.
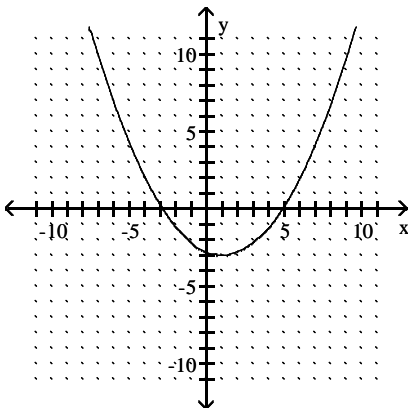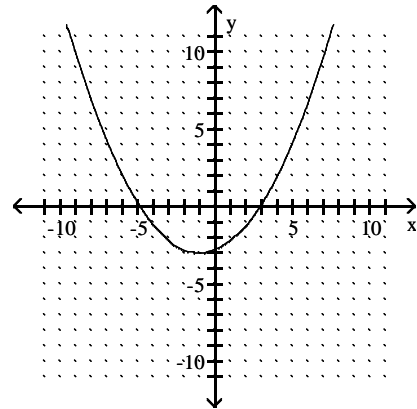
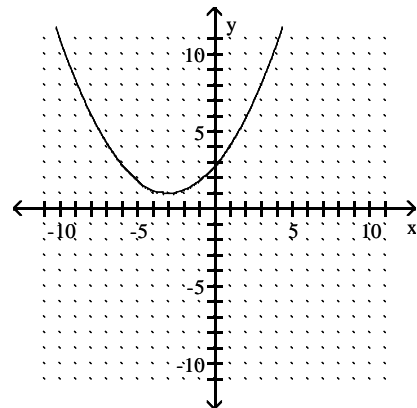4) $f(x) = \frac{1}{5}(x - 1)^2 - 3$

A) vertex (3, –1); axis x = 3

B) vertex (–1, –3); axis x = –1

C) vertex (1, –3); axis x = 1

D) vertex (–3, 1); axis x = –3

Perform the indicated operation. Simplify if possible.

5) $\dfrac{x}{x^2 - 16} - \dfrac{5}{x^2 + 5x + 4}$

A) $\dfrac{x^2 - 4x + 20}{(x - 4)(x + 4)}$

B) $\dfrac{x^2 + 4x + 20}{(x - 4)(x + 4)(x + 1)}$

C) $\dfrac{x^2 - 4}{(x - 4)(x + 4)(x + 1)}$

D) $\dfrac{x^2 - 4x + 20}{(x - 4)(x + 4)(x + 1)}$

Solve the system for the variable x.

6)
$$\begin{cases} x - y + 5z = -10 \\ 4x + z = -1 \\ x + 4y + z = 19 \end{cases}$$

A) $x = -1$ B) $x = 0$ C) $x = 5$ D) $\varnothing$

Find the distance between the pair of points.

7) $(1, 5)$ and $(-4, -3)$

A) 40 units   B) $\sqrt{89}$ units   C) 89 units   D) $\sqrt{39}$ units

Solve.

8) One pump can drain a pool in 12 minutes. When a second pump is also used, the pool only takes 9 minutes to drain. How long would it take the second pump to drain the pool if it were the only pump in use?

A) 36 minutes   B) $5\dfrac{1}{7}$ minutes   C) $\dfrac{1}{36}$ minute   D) 105 minutes

Use the quadratic formula to solve the equation.

9) $2x^2 - 3x + 5 = 0$

A) $\dfrac{-3 - i\sqrt{31}}{4}, \dfrac{-3 + i\sqrt{31}}{4}$

B) $\dfrac{3 - \sqrt{31}}{4}, \dfrac{3 + \sqrt{31}}{4}$

C) $\dfrac{3 - i\sqrt{31}}{4}, \dfrac{3 + i\sqrt{31}}{4}$

D) $\dfrac{-3 - \sqrt{31}}{4}, \dfrac{-3 + \sqrt{31}}{4}$

Solve.

10) A certain rectangle's length is 10 feet longer than its width. If the area of the rectangle is 75 square feet, find its dimensions.

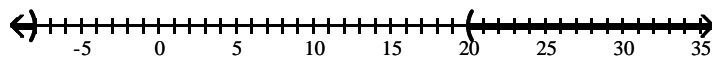   A) 4 ft by 16 ft   B) 4 ft by 14 ft   C) 5 ft by 15 ft   D) 6 ft by 16 ft
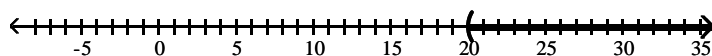
Solve the absolute value inequality. Graph the solution set.
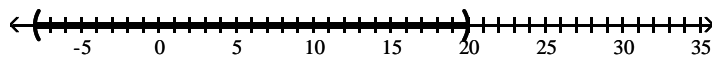
11) $|x - 6| > 14$

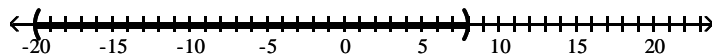A) $(-\infty, -8) \cup (20, \infty)$

B) $(20, \infty)$

C) $(-8, 20)$

D) $(-20, 8)$

Find the center and the radius of the circle.

    12) $x^2 + y^2 + 4x - 18y + 85 = 9$

        A) center (−9, 2), radius = 9   B) center (−2, 9), radius = 3

        C) center (9, −2), radius = 3   D) center (2, −9), radius = 9

Solve.

    13) An arrow is fired into the air with an initial velocity of 96 feet per second. The height in feet of the arrow t seconds after it was shot into the air is given by the function $h(t) = -16t^2 + 96t$. Find the maximum height of the arrow.

        A) 48 ft   B) 240 ft   C) 432 ft   D) 144 ft

Add the expressions. Assume all variables represent positive real numbers.

    14) $6 \sqrt[3]{x^3 y^{13}} + 2xy \sqrt[3]{27 y^{10}}$

        A) $8x^2 y^5 \sqrt[3]{y}$ B) $12\,xy^4 \sqrt[3]{y}$ C) $8xy^5 \sqrt[3]{27y}$ D) $12x^2 y^4 \sqrt[3]{3y}$

Solve.

    15) A vendor sells hot dogs and bags of potato chips. A customer buys 3 hot dogs and 4 bags of potato chips for $8.25. Another customer buys 5 hot dogs and 2 bags of potato chips for $10.25. Find the cost of each item.

        A) $0.75 for a hot dog; $1.75 for a bag of potato chips

        B) $2.00 for a hot dog; $1.00 for a bag of potato chips

        C) $1.75 for a hot dog; $1.00 for a bag of potato chips

        D) $1.75 for a hot dog; $0.75 for a bag of potato chips

Rationalize the denominator and simplify. Assume that all variables represent positive real numbers.

16) $\dfrac{7}{\sqrt{x} + 2}$
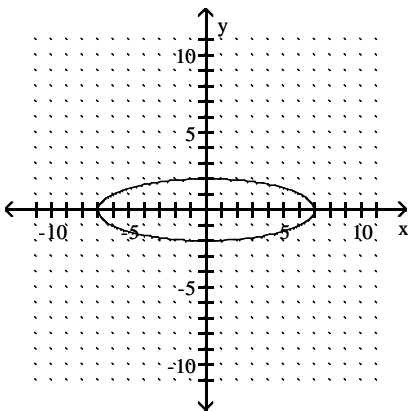
A) $\dfrac{-14 + 7\sqrt{x}}{x - 4}$ B) $\dfrac{-14 - 7\sqrt{x}}{x + 4}$ C) $\dfrac{-14 + 7\sqrt{x}}{x^2 - 4}$ D) $\dfrac{-14 - 7\sqrt{x}}{x - 4}$

Find the domain and the range of the relation. Use the vertical line test to determine whether the graph is the graph of a function.

17)

A) domain: [−7, 7]
   range: [−2, 2]
   not a function

B) domain: [−2, 2]
   range: [−7, 7]
   function

C) domain: [−2, 2]
   range: [−7, 7]
   not a function

D) domain: [−7, 7]
   range: [−2, 2]
   function

Solve.

18) $\sqrt{21 - x} = x - 1$

A) ∅   B) −4, 5   C) −4   D) 5

Find the indicated value.

    19)   Find f(−3) when f(x) = 4x² − 2x − 5

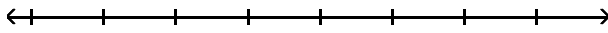   A) 25   B) 37   C) 36   D) 47
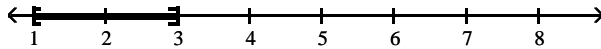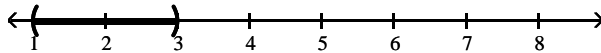
Solve the compound inequality. Graph the solution set.
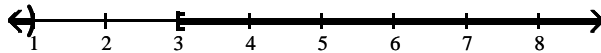
    20)   12x − 8 < 4x or −2x ≤ −6

A) [1, 3]

B) (1, 3)

C) (−∞, 1) ∪ [3, ∞)

D) ∅
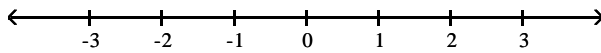
Write the solution set using interval notation.

    21) $\dfrac{3x + 1}{14} - \dfrac{1 + 6x}{7} \le -\dfrac{1}{2}$

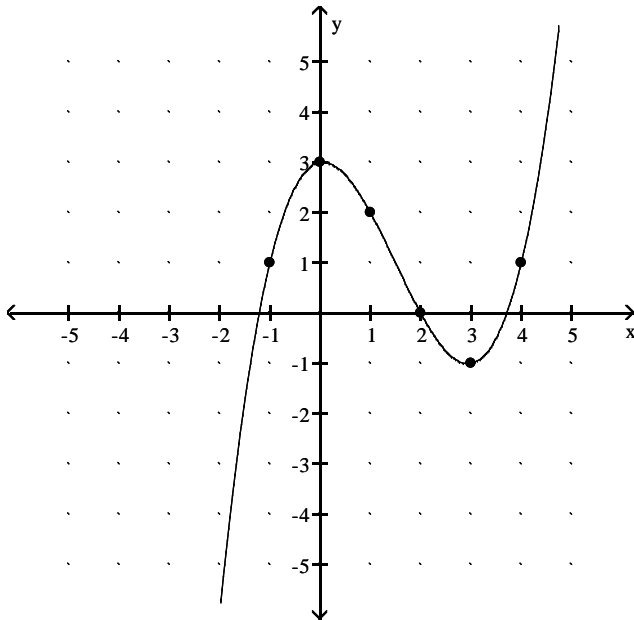   A) $[\frac{2}{3}, \infty)$ B) $[-\frac{2}{3}, \infty)$ C) $(-\infty, \frac{2}{3}]$ D) $(\frac{2}{3}, \infty)$

Find the indicated value.

22) Use the graph to find f(1).

A) −1   B) 2   C) 4   D) 3

Simplify.

23)

$$\frac{1 - \dfrac{6}{x}}{x - \dfrac{36}{x}}$$

A) x − 6   B) $\dfrac{1}{x + 6}$ C) x + 6   D) $\dfrac{1}{x - 6}$

Solve.

24) The population of a town increased by 70% in 5 years. If the population is currently 21,000, find the population of this town 5 years ago. (Round to the nearest whole, if necessary.)

A) 30,000   B) 6300   C) 12,353   D) 14,700

Solve the equation.

25) $\dfrac{1}{x} + \dfrac{1}{x+5} = \dfrac{x+6}{x+5}$

    A) –5, 1   B) 5, 1   C) 1   D) –5, –1

Use the properties of exponents to simplify the expression. Write with positive exponents.

26) $\dfrac{(3x^{6/5})^4}{x^{5/2}}$

    A) $3x^{73/10}$ B) $81x^{73/10}$ C) $81x^{23/10}$ D) $3x^{23/10}$

Solve for x.

27) $\log_3 x = -2$

    A) –6   B) $\dfrac{1}{8}$ C) $\dfrac{1}{9}$ D) 1

Solve the equation.

28)

$4^{(7+3x)} = \dfrac{1}{16}$

    A) –3   B) 4   C) 3   D) $\dfrac{1}{4}$

Solve the absolute value equation.

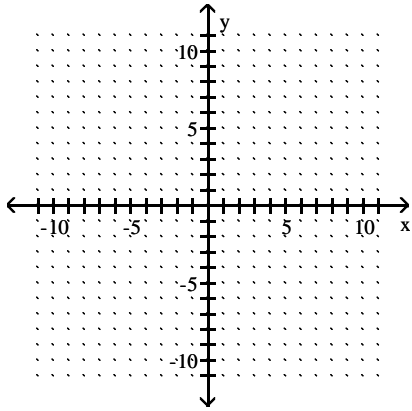29) $|6x + 8| + 8 = 14$

    A) $\dfrac{1}{3}, \dfrac{7}{3}$ B) $-\dfrac{1}{4}, -\dfrac{7}{4}$ C) $-\dfrac{1}{3}, -\dfrac{7}{3}$ D) $\varnothing$
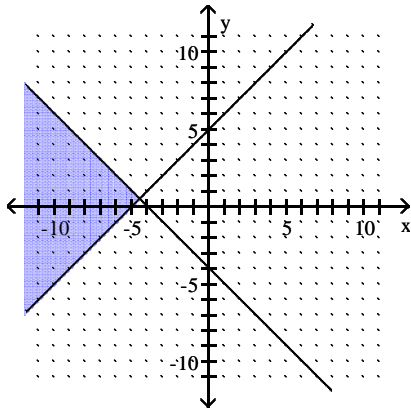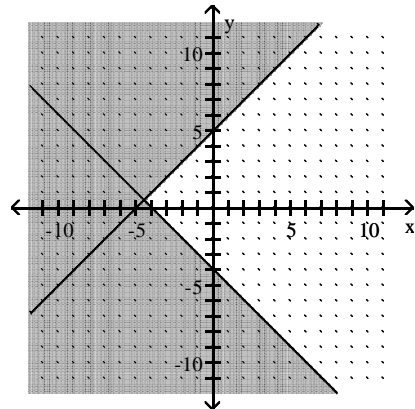
Graph the union.
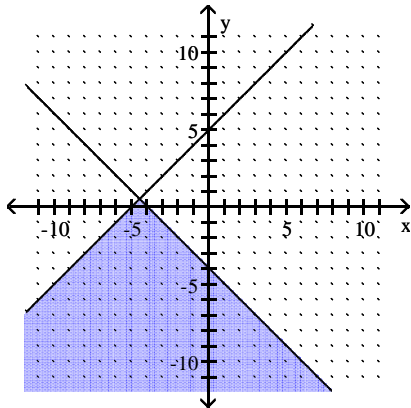
30) The union of $x + y \leq -4$ or $x - y \geq -5$

A)

B)

C)

D)
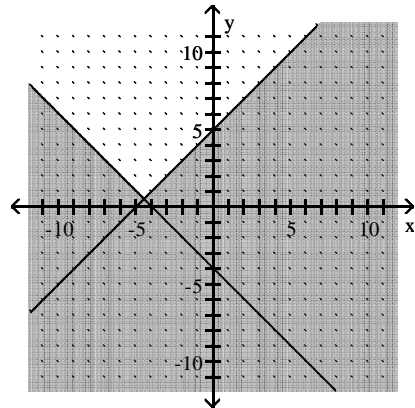
1) D
2) C
3) B
4) C
5) D
6) B
7) B
8) A
9) C
10) C
11) A
12) B
13) D
14) B
15) D
16) A
17) A
18) D
19) B
20) C
21) A
22) B
23) B
24) C
25) C
26) C
27) C
28) A
29) C
30) D