

Intermediate Algebra

You should be able to find the correct solution to each problem without working backwards from the given solutions and without using a calculator

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

Solve the problem.

- 1) Anne and Nancy use a metal alloy that is 16% copper to make jewelry. How many ounces of an alloy that is 10% copper must be mixed with an alloy that is 20% copper to form 55 ounces of the desired alloy? 1) _____
 A) 24 ounces B) 22 ounces C) 38 ounces D) 33 ounces
- 2) Find the hydrogen ion concentration of a solution whose pH is 5.8. Use the formula $\text{pH} = -\log [\text{H}^+]$. 2) _____
 A) 7.63×10^{-1} B) -7.63×10^{-1} C) 6.31×10^5 D) 1.58×10^{-6}
- 3) The number of bacteria growing in an incubation culture increases with time according to $B = 4400(3)^x$, where x is time in days. Find the number of bacteria when $x = 0$ and $x = 2$. 3) _____
 A) 4400, 118,800 B) 13,200, 39,600 C) 4400, 26,400 D) 4400, 39,600
- 4) Use the formula $L = 10 \cdot \log \frac{I}{I_0}$, where the loudness of a sound in decibels is determined by I, the number of watts per square meter produced by the soundwave, and $I_0 = 10^{-12} \text{ W/m}^2$. A certain noise produces $2.66 \times 10^{-4} \text{ W/m}^2$ of power. What is the decibel level of this noise? 4) _____
 A) 84 dB B) 194 dB C) 74 dB D) 8 dB

Rewrite as an equivalent logarithmic equation. Do not solve.

- 5) $y^z = 7$ 5) _____
 A) $z = \log_g y$ B) $y = \log_z 7$ C) $y = \log_g z$ D) $z = \log_y 7$
- 6) $6561^{1/4} = 9$ 6) _____
 A) $\frac{1}{4} = \log_{6561} 9$ B) $9 = \log_{1/4} 6561$ C) $9 = \log_{6561} \frac{1}{4}$ D) $\frac{1}{4} = \log_9 6561$

Solve.

- 7) In triangle ABC, the measure of angle B is 66° more than twice the measure of angle A. The measure of angle C is 54° more than that of angle A. Find the angle measures. 7) _____
 A) $15^\circ, 96^\circ, 54^\circ$ B) $11^\circ, 88^\circ, 81^\circ$ C) $15^\circ, 96^\circ, 69^\circ$ D) $18^\circ, 102^\circ, 60^\circ$
- 8) The speed of a stream is 5 mph. If a boat travels 60 miles downstream in the same time that it takes to travel 30 miles upstream, what is the speed of the boat in still water? 8) _____
 A) 17 mph B) 18 mph C) 15 mph D) 10 mph
- 9) A projectile is thrown upward so that its distance above the ground after t seconds is $h = -11t^2 + 418t$. After how many seconds does it reach its maximum height? 9) _____
 A) 38 sec B) 9 sec C) 19 sec D) 28.5 sec
- 10) $\sqrt{3x+1} = 3 + \sqrt{x-4}$ 10) _____
 A) -5, -8 B) 5, 8 C) No solution D) -1

- 11) Frank can type a report in 4 hours and James takes 5 hours. How long will it take the two of them typing together? 11) _____
- A) $\frac{20}{9}$ hr B) 20 hr C) $\frac{9}{20}$ hr D) 5 hr

- 12) $x^2 - 8x + 65 = 0$ 12) _____
- A) $8 \pm 14i$ B) $4 \pm 7i$ C) 11, -3 D) $-4 \pm 7i$

Simplify.

- 13) $\frac{\frac{1}{k+3} - \frac{5}{k-7}}{\frac{2}{k-7} + \frac{1}{k+2}}$ 13) _____

- A) $\frac{(-4k - 22)(k + 2)}{(k + 3)(3k + 3)}$ B) $\frac{(-4k - 22)(k - 2)}{(k - 3)(3k - 3)}$
- C) $\frac{(-4k - 22)(k + 2)}{(k + 3)(3k - 3)}$ D) $\frac{(-4k - 22)}{(k + 3)(3k - 3)}$

- 14) $\log_8 32$ 14) _____
- A) $\frac{5}{3}$ B) $\frac{5}{4}$ C) $\frac{3}{2}$ D) $\frac{4}{3}$

Find a formula for the inverse of the function described below.

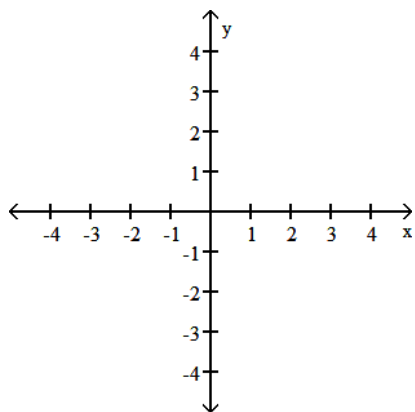
- 15) A size-12 dress in Country C is size 40 in Country D. A function that converts dress sizes in Country C to those in Country D is $f(x) = 2(x + 8)$. 15) _____
- A) $f^{-1}(x) = \frac{x}{2} + 8$ B) $f^{-1}(x) = x - 8$ C) $f^{-1}(x) = \frac{x - 8}{2}$ D) $f^{-1}(x) = \frac{x - 16}{2}$

Find the center and the radius of the circle.

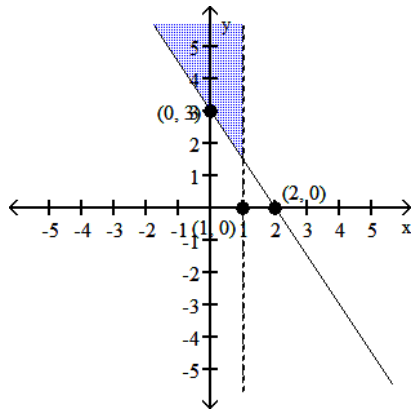
- 16) $x^2 + y^2 - 16x + 18y + 145 = 16$ 16) _____
- A) (-8, 9), $r = 16$ B) (-9, 8), $r = 4$ C) (9, -8), $r = 16$ D) (8, -9), $r = 4$

Graph the system of linear inequalities.

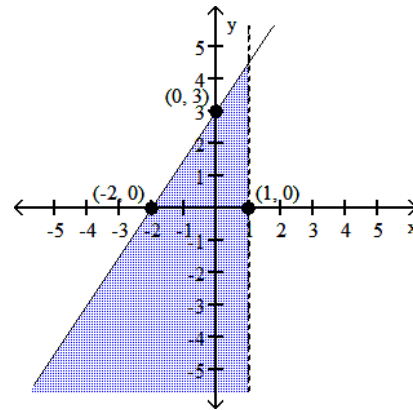
- 17) $3x - 2y \geq -6$ and $x - 1 < 0$ 17) _____



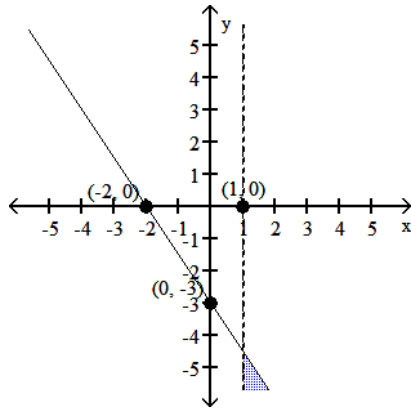
A)



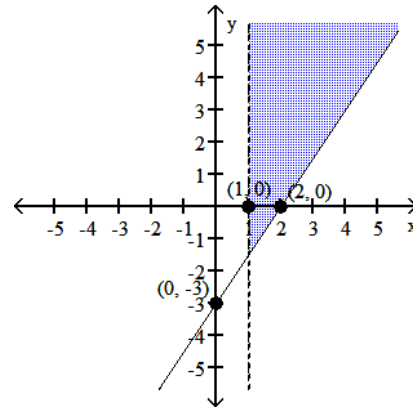
B)



C)



D)



Rationalize the denominator. Assume all variables represent positive numbers.

18)

$$\sqrt{\frac{15m^3n^3}{147m^2n^{13}}}$$

A) $\frac{\sqrt{35m}}{21n^{10}}$

B) $\frac{m\sqrt{5}}{49n^{10}}$

C) $\frac{\sqrt{5m}}{7n^5}$

D) $\frac{5m}{7n^5}$

18) _____

19)

$$\sqrt[3]{\frac{5}{9x^2}}$$

A) $\frac{\sqrt[3]{45x}}{9x}$

B) $\frac{\sqrt[3]{405x}}{81}$

C) $\frac{\sqrt[3]{405x^2}}{9x}$

D) $\frac{\sqrt[3]{15x}}{3x}$

19) _____

Solve. Provide answers in interval notation.

20) $(x - 4)(x + 9) > 0$

A) $(-\infty, -9) \cup (4, \infty)$

B) $(-9, 4)$

C) $(-9, \infty)$

D) $(-\infty, -4) \cup (9, \infty)$

20) _____

Solve the absolute-value inequality.

21) $|3y - 2| - 1 < -10$

A) $\left(-\infty, \frac{11}{3}\right) \cup \left(-\frac{7}{3}, \infty\right)$

C) $\emptyset$

B) $\left(-\frac{7}{3}, \infty\right)$

D) $\left(\frac{11}{3}, -\frac{7}{3}\right)$

21) _____

Solve the equation.

22) $|7m + 3| + 3 = 9$

A) $\emptyset$

B) $\left\{\frac{3}{7}, -\frac{9}{7}\right\}$

C) $\left\{-\frac{3}{7}, \frac{9}{7}\right\}$

D) $\{1, -3\}$

22) _____

Solve. Where appropriate, include approximations to the nearest thousandth. If no solution exists, state this.

23) $\log_3(x + 4) + \log_3(x + 1) = \log_3 40$

A) -9, 4

B) 4

C) 9

D) No solution

23) _____

24) $\log_9 x = -4$

A) $\frac{1}{262,144}$

B) 262,144

C) 6561

D) $\frac{1}{6561}$

24) _____

25) $49 = 2e^{3x}$

A) 1.872

B) 1.066

C) 2.912

D) 3.199

25) _____

26) $2^{(x+1)} = 8$

A) 3

B) 2

C) -1

D) -2

26) _____

Express as a single logarithm, and, if possible, simplify.

27) $\frac{1}{2} \log_a x + 7 \log_a y - 3 \log_a x$

A) $\log_a x^{5/2} y^2$

B) $\log_a \frac{y^7}{x^{5/2}}$

C) $\log_a \frac{x^{5/2}}{y^2}$

D) $\log_a \frac{1}{x^{5/2} y^2}$

27) _____

Multiply and simplify.

28) $\frac{k^2 + 12k + 32}{k^2 + 13k + 40} \cdot \frac{k^2 + 5k}{k^2 + 6k + 8}$

A) $\frac{1}{k+2}$

B) $\frac{k^2 + 5k}{k+2}$

C) $\frac{k}{k+2}$

D) $\frac{k}{k^2 + 13k + 40}$

28) _____

Perform the indicated operation and simplify. Write the answer in the form $a + bi$.

29) $(8 - 6i)(5 + 9i)$

A) $94 - 42i$

B) $94 + 42i$

C) $-14 - 102i$

D) $-54i^2 + 42i + 40$

29) _____

30) $\frac{3 + 4i}{8 - 3i}$

A) $\frac{12}{55}$

B) $\frac{36}{73} - \frac{23}{73}i$

C) $\frac{36}{55} - \frac{41}{55}i$

D) $\frac{12}{73} + \frac{41}{73}i$

30) _____

Simplify by removing a factor equal to 1.

$$31) \frac{x^3 - 64}{x^2 + 4x + 16}$$

A) $x + 16$

B) $1 + 4x$

C) $x + 4$

D) $x - 4$

31) _____

Solve by completing the square.

$$32) p^2 + 5p - 5 = 0$$

A) $\frac{5 + 3\sqrt{5}}{2}$

B) $\frac{-5 - 3\sqrt{5}}{2}$

C) $-5 \pm 3\sqrt{5}$

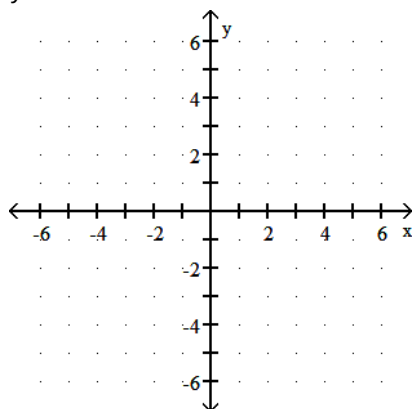
D) $\frac{-5 \pm 3\sqrt{5}}{2}$

32) _____

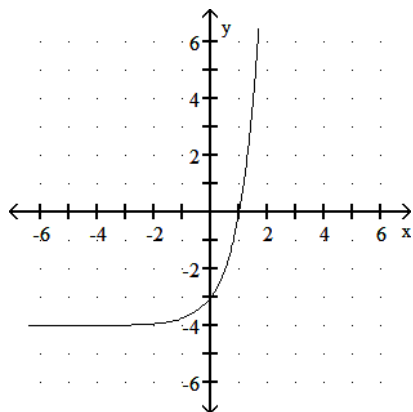
Graph.

$$33) y = 4^x + 4$$

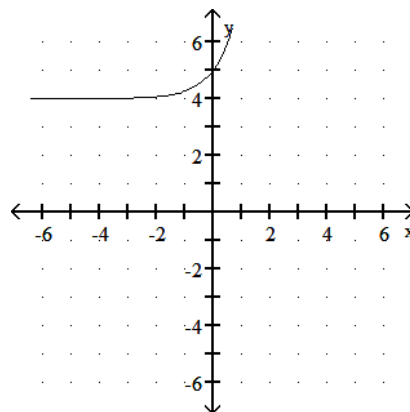
33) _____



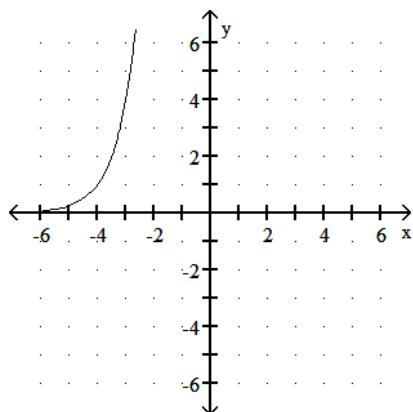
A)



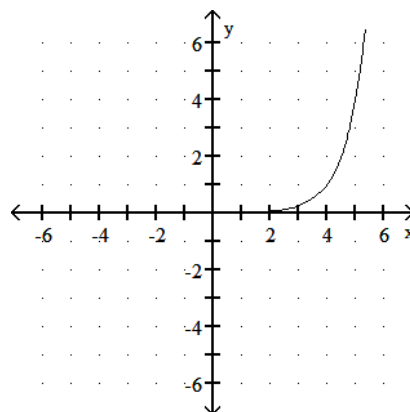
B)



C)



D)



Solve the system. If the system's equations are dependent or if there is no solution, state this.

34) $2x - 5y + 4z = 5$
 $-7x + 8y - 4z = 2$
 $10x - 25y + 20z = -7$
 A) (5, 5, -1)
 C) No solution

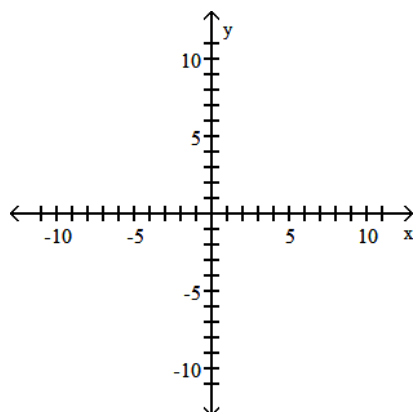
B) The equations are dependent.
 D) (5, 2, -7)

34) _____

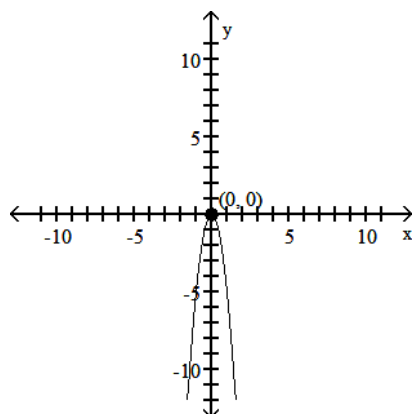
Graph. Be sure to label the vertex. Round to the nearest hundredth if necessary.

35) $y = -5x^2$

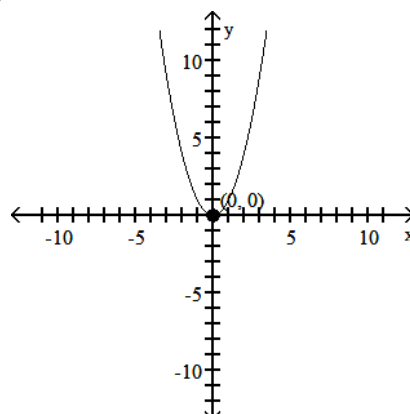
35) _____



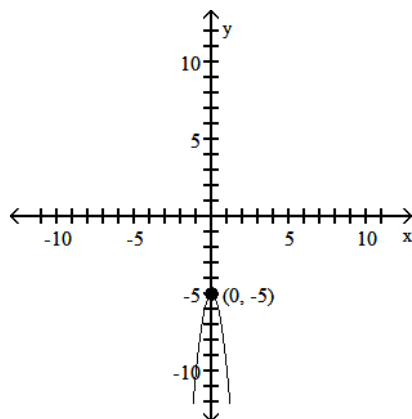
A)



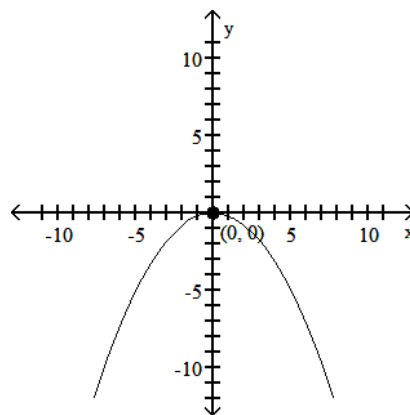
B)



C)



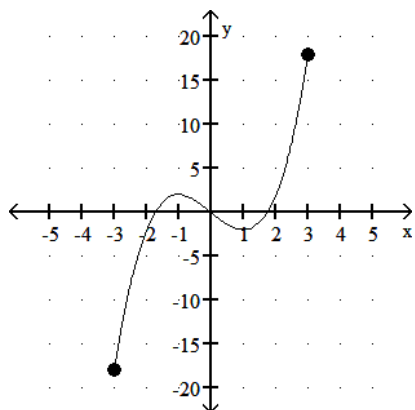
D)



For the function represented in the graph, determine the domain or range, as requested.

36) Find the domain.

36) _____



- A) $\{x \mid -18 \leq x \leq 18\}$
 C) $\{x \mid -3 \leq x \leq 3\}$

- B) $\{x \mid x \text{ is a real number}\}$
 D) $\{x \mid -5 \leq x \leq 5\}$

Determine whether the function is one-to-one. If so, find a formula for the inverse.

37) $g(x) = x^2 - 2$

37) _____

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

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

C) $g^{-1}(x) = \frac{1}{\sqrt{x+2}}$

D) Not a one-to-one function

Find an equation for the described linear function.

38) Through $(0, -3)$ and parallel to $-9x + y = 4$

38) _____

A) $y = \frac{1}{9}x - 3$

B) $y = 9x - 3$

C) $y = -9x + 3$

D) $y = -9x - 3$

Perform the indicated operation and simplify.

39) $\frac{a+b}{a-b} - \frac{3ab+3b^2}{a^2-b^2}$

39) _____

A) $\frac{a-2b}{a+b}$

B) $\frac{a+2b}{a-b}$

C) $\frac{a^2-2ab-2b^2}{a^2-b^2}$

D) $\frac{a-2b}{a-b}$

Solve the system.

40) $x - y + 8z = -107$

40) _____

$6x + z = 17$

$3y - 5z = 89$

A) $(5, -8, -13)$

B) $(5, 8, -13)$

C) $(-5, 8, 13)$

D) $(-5, -8, 13)$

Answer Key

Testname: UNTITLED1

- 1) B
- 2) D
- 3) D
- 4) A
- 5) D
- 6) A
- 7) C
- 8) C
- 9) C
- 10) B
- 11) A
- 12) B
- 13) C
- 14) A
- 15) D
- 16) D
- 17) B
- 18) C
- 19) D
- 20) A
- 21) C
- 22) B
- 23) B
- 24) D
- 25) B
- 26) B
- 27) B
- 28) C
- 29) B
- 30) D
- 31) D
- 32) D
- 33) B
- 34) C
- 35) A
- 36) C
- 37) D
- 38) B
- 39) D
- 40) B