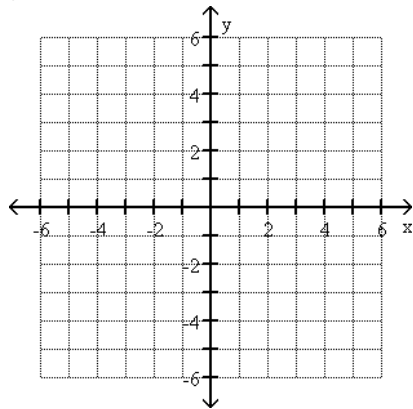MULTIPLE CHOICE.  Choose the one alternative that best completes the statement or answers the question.
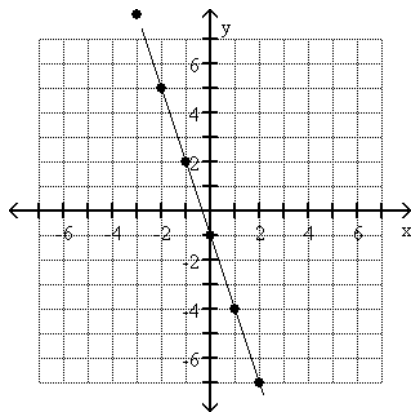
Graph the equation. Select integers for x, $-3 \leq x \leq 3$.

1) $y = 3x - 1$
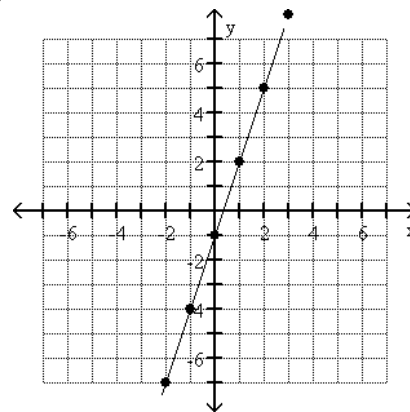
1) _____
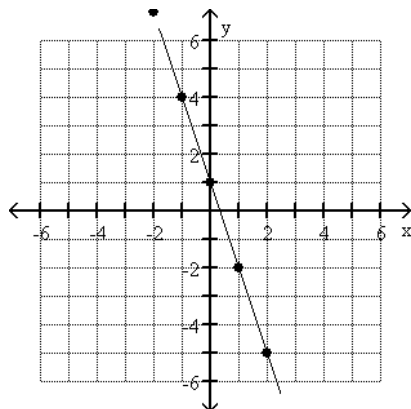

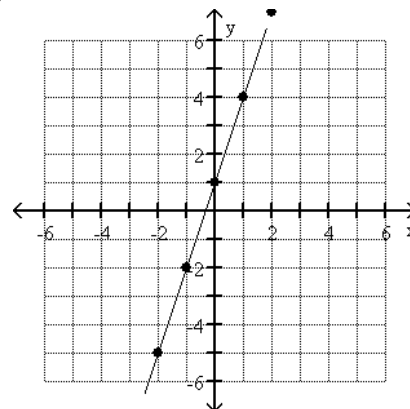
A)


B)


C)


D)


Find f of each given value of x.

2) $f(x) = 6x^2 + 6x + 6$          a. $f(9)$          b. $f(-6)$

2) _____

A) 34,992, 15,552          B) 168, -102          C) 546, 186          D) 2976, 1266

Provide an appropriate response.

3) Let $f(x) = x^2 + x - 3$ and $g(x) = 5x + 2$.      3) _____
   Find $g(-1)$ and $f(g(-1))$.

   A) $g(-1) = -7$;          B) $g(-1) = -3$;          C) $g(-1) = -3$;          D) $g(-1) = -5$;
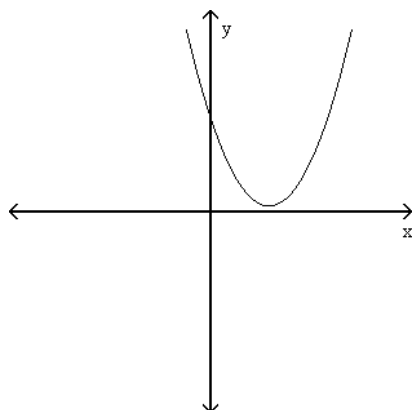      $f(g(-1)) = 39$             $f(g(-1)) = 3$             $f(g(-1)) = 15$             $f(g(-1)) = 17$

Use the vertical line test to determine if y is a function of x.

4)                                                                                4) _____



   A) Function                                    B) Not a function
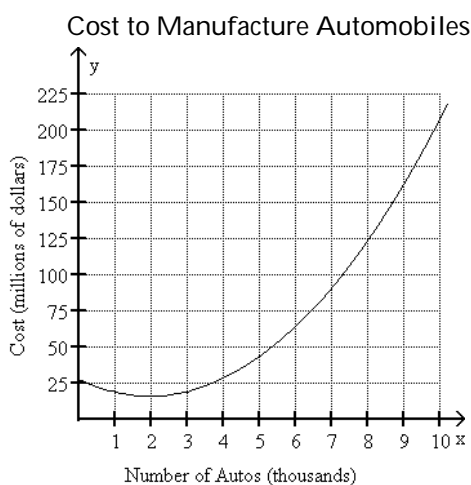
Provide an appropriate response.

5) The cost, in millions of dollars, for a company to manufacture x thousand automobiles is given by      5) _____
   the function $C(x) = 3x^2 - 12x + 28$. Find the number of automobiles that must be produced to
   minimize cost.

Cost to Manufacture Automobiles



   A) 2 thousand automobiles                      B) 16 thousand automobiles
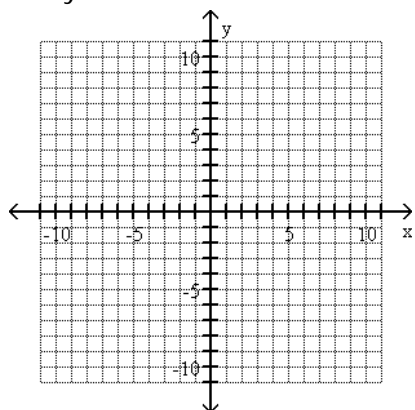   C) 4 thousand automobiles                      D) 6 thousand automobiles

Use the x- and y-intercepts to graph the linear equation.

6) x + 2y = 10



6) _____

A)
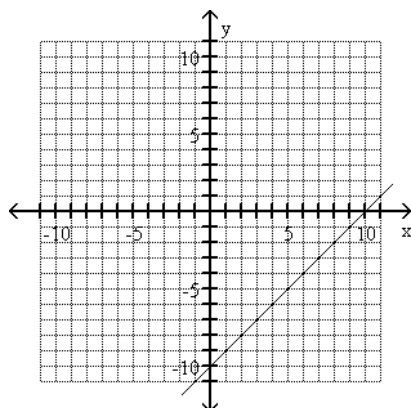


B)
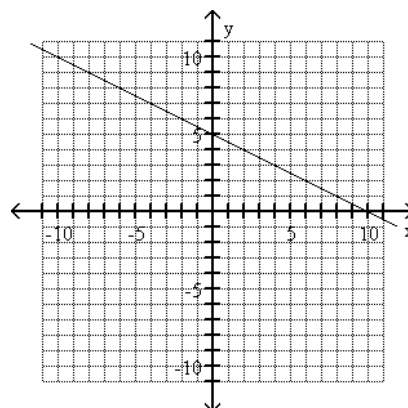


C)
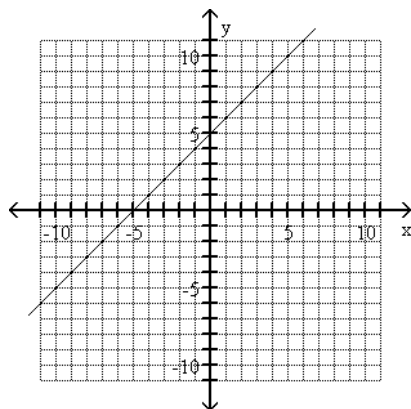


D)
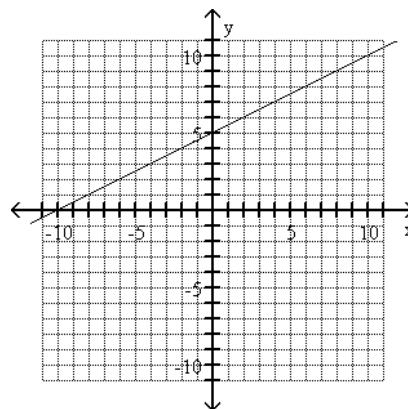


Calculate the slope of the line passing through the given points. If the slope is undefined, so state. Then indicate whether the line rises, falls, is horizontal, or is vertical.

7) (-3, -4), (4, -1)

7) _____

A) - 5, falls    B) $\frac{7}{3}$, rises    C) - $\frac{3}{7}$, falls    D) $\frac{3}{7}$, rises

Graph the linear function using the slope and y-intercept.

8) $y = -\dfrac{1}{4}x + 2$

8) _____

A)

B)

C)

D)

4
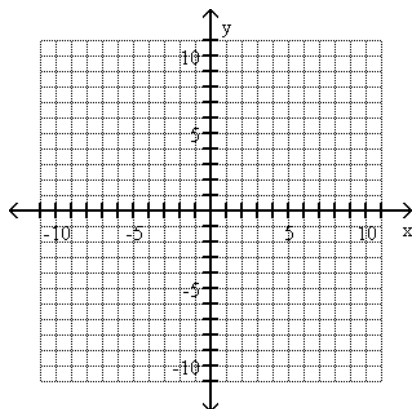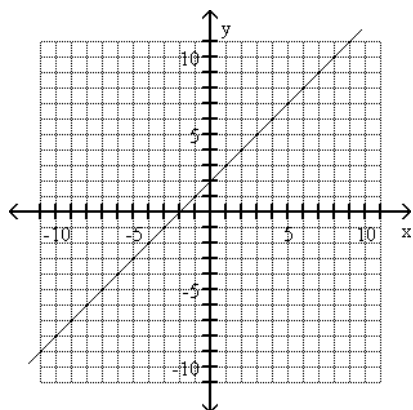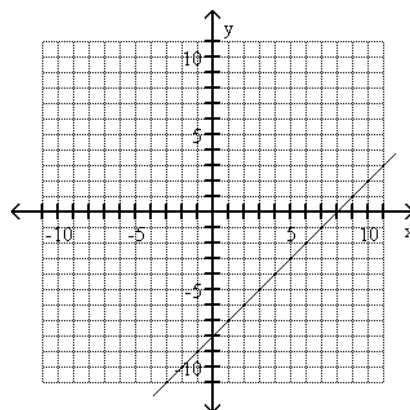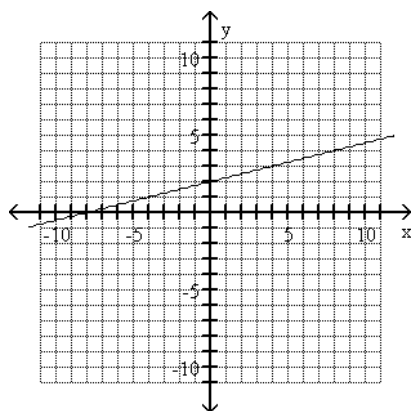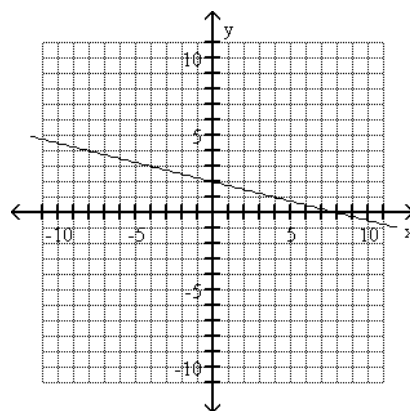
Solve the problem.

9) The altitude above sea level of an airplane just after taking off from an airport on a high plateau is given by the linear function y = 500x + 2613, where y is in feet and x is the time in minutes since take-off.  Find and interpret the slope and y-intercept.

9) _____

    A) m = 2613; The altitude of the airplane increases 2613 feet every minute.  b = 2613; The altitude of the airport where the airplane took-off is 500 feet above sea level.

    B) m = 2613; The minutes since take-off increases 2613 for every foot of altitude.  b = 500; The minutes that the plane takes to get to the altitude of the airport from sea level.

    C) m = 500; The altitude of the airplane increases 500 feet every minute.  b = 2613; The altitude of the airport where the airplane took-off is 2613 feet above sea level.

    D) m = 500; The minutes since take-off increases 500 for every foot of altitude.  b = 2613; The minutes that the plane takes to get to the altitude of the airport from sea level.

Determine whether the given ordered pair is a solution to the system.

10) (3, -5)

$$4x + y = 7$$
$$2x + 4y = -14$$

10) _____

    A) no                                    B) yes

Solve the system by the substitution method. Be sure to check all proposed solutions.

11) $x + 7y = 2$
    $-4x + 8y = -8$

11) _____

    A) {(-2, -1)}           B) {(2, 0)}           C) {(3, 2)}           D) ∅

Solve the system by the addition method. Be sure to check all proposed solutions.

12) $5x = 21y + 3$
    $-2x + 8y = 2$

12) _____

    A) $\{(8, \frac{9}{4})\}$          B) {(-33, -8)}          C) $\{(-8, -\frac{7}{4})\}$         D) {(-7, 8)}

Solve by the method of your choice. Identify whether the system has no solution or infinitely many solutions, using set notation to express the solution set.

13) $3x + y = 12$
    $y = 9 - 3x$

13) _____

    A) {(0, 12)}                              B) ∅

    C) {(5, -3)}                            D) {(x, y) | 3x + y = 12}

Let x represent one number and let y represent the other number. Use the given conditions to write a system of equations. Solve the system and find the numbers.

14) One number is four more than a second number. Two times the first number is 10 more than four times the second number.

14) _____

    A) - 9 and - 13        B) 4 and 0          C) 2 and - 2         D) 3 and - 1

Solve the problem.

15) Julie and Eric row their boat (at a constant speed) 63 miles downstream for 7 hours, helped by the current. Rowing at the same rate, the trip back against the current takes 9 hours. Find the rate of the current.

15) _____

    A) 1 mph                B) 8 mph                C) 0.5 mph                D) 2 mph

Graph the linear inequality.

16) $3x + 4y \le 12$

16) _____
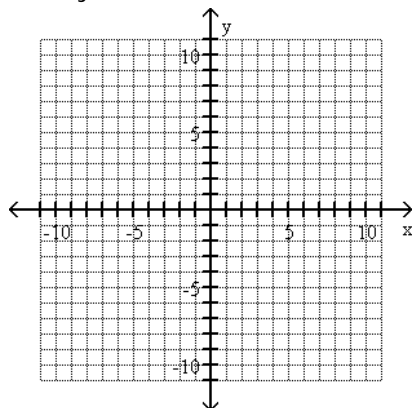
A)
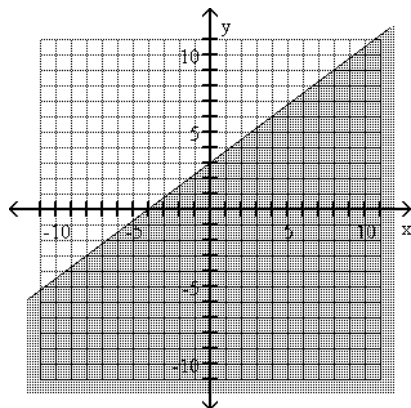
B)
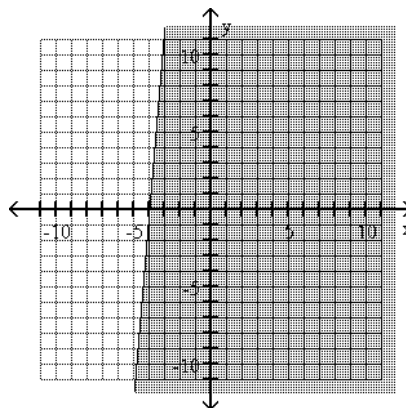
C)
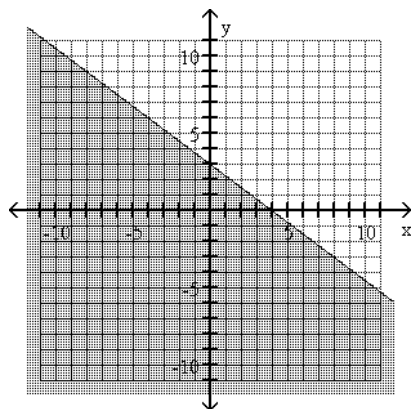
D)
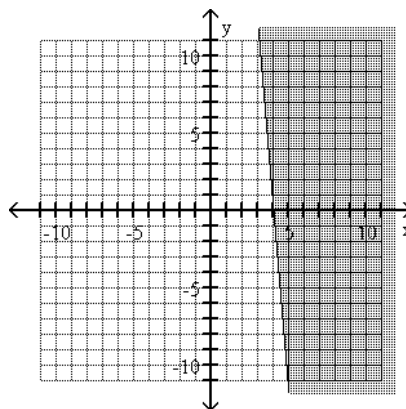
Solve the problem.

17) Yvette has up to $3000 to invest and has chosen to put her money into telecommunications and pharmaceuticals. The telecommunications investment is to be no more than 5 times the pharmaceuticals investment. Write a system of inequalities to describe the situation. Let x = amount to be invested in telecommunications and y = amount to be invested in pharmaceuticals.

17) _____

A) x + y ≤ 3000
   x ≤ 5y
   x ≥ 0
   y ≥ 0

B) x + y ≤ 3000
   5x ≤ y
   x ≥ 0
   y ≥ 0

C) x + y = 3000
   y ≥ 5x
   x ≥ 0
   y ≥ 0

D) x + y = 3000
   x ≤ 5y
   x ≥ 0
   y ≥ 0

Graph the system of inequalities.

18) x - 2y ≤ 2
    x + y ≤ 0

18) _____



A)


B)


C)


D)


7
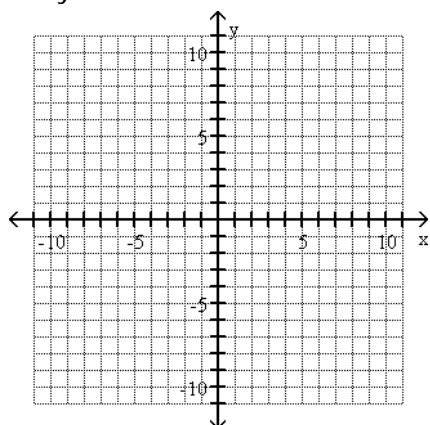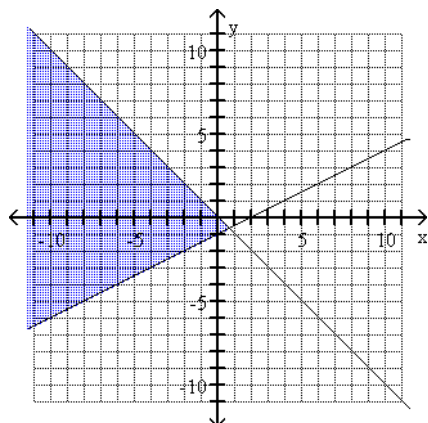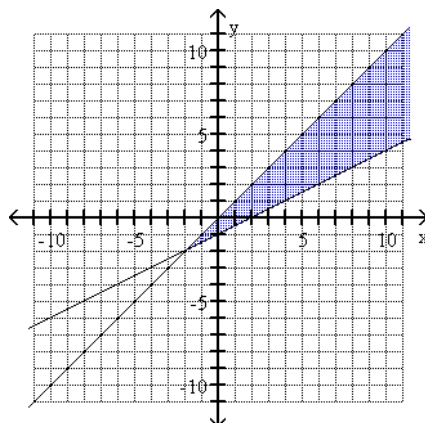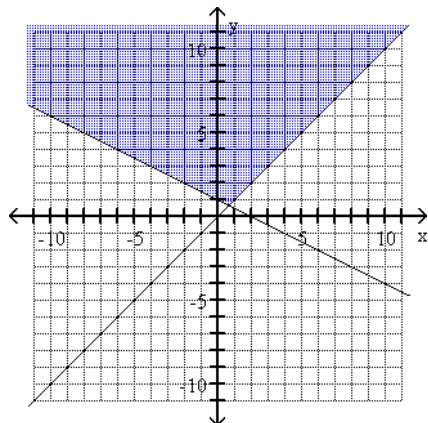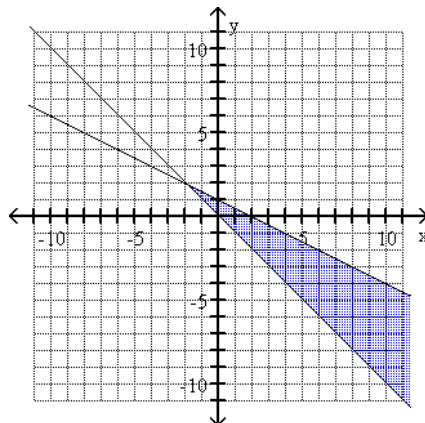
Find the value of the objective function at each corner of the graphed region. Use this information to answer the question.
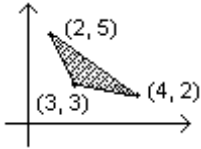


19) Objective Function   z = x + 5y
    What is the maximum value of the objective function?

      A) 14                  B) 27                  C) 18                  D) 22

19) _____

Write a system of three inequalities that describe the constraints in the problem.

20) An office manager is buying used filing cabinets. Small file cabinets cost $6 each and large file cabinets cost $11 each, and the manager cannot spend more than $115 on file cabinets. A small cabinet takes up 5 square feet of floor space and a large cabinet takes up 8 square feet, and the office has no more than 90 square feet of floor space available for file cabinets. The manager must buy at least 5 file cabinets in order to get free delivery. Let x = the number of small file cabinets bought and y = the number of large file cabinets bought.

      A) $6x + 11y \le 115; 8x + 5y \le 90; x \ge 5$                  B) $6x + 11y \le 115; 5x + 8y \le 90; x + y \ge 5$
      C) $6x + 11y \le 115; 5x + 8y \le 90; x + y \le 5$                  D) $6x + 11y \le 115; 5x + 8y \le 90; y \ge 5$

20) _____

Use the two steps for solving a linear programming problem to solve the problem.

21) Zach is planning to invest up to $45,000 in corporate and municipal bonds. The least he will invest in corporate bonds is $7000 and he does not want to invest more than $29,000 in corporate bonds. He also does not want to invest more than $25,906 in municipal bonds. The interest is 8.2% on corporate bonds and 6.4% on municipal bonds. This is simple interest for one year. What is the maximum income?

      A) $19,402                  B) $14,354                  C) $32,402                  D) $48,402

21) _____

Graph the exponential function whose equation is given. Start by using -2, -1, 0, 1, and 2 for x and finding the corresponding values for y.

22) $y = 2^{x} + 3$

22) _____
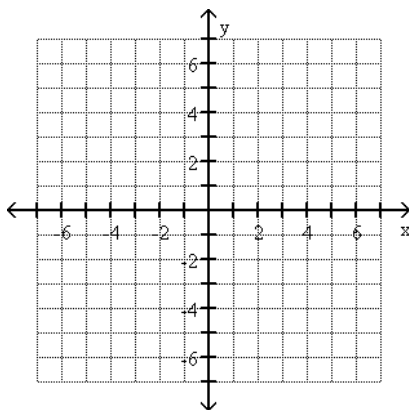
A)
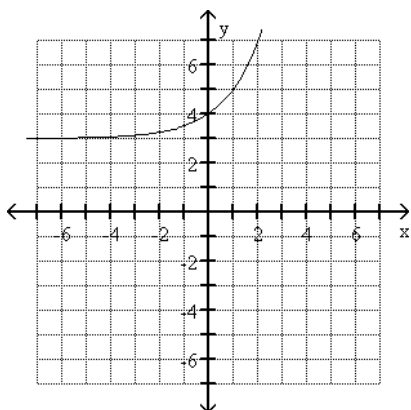


B)
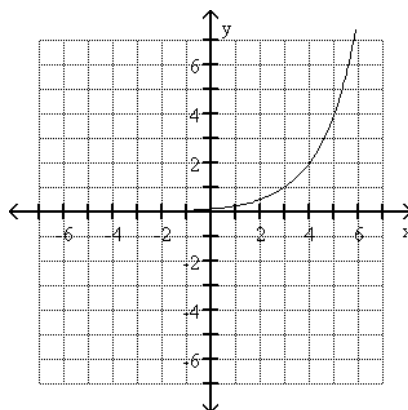


C)
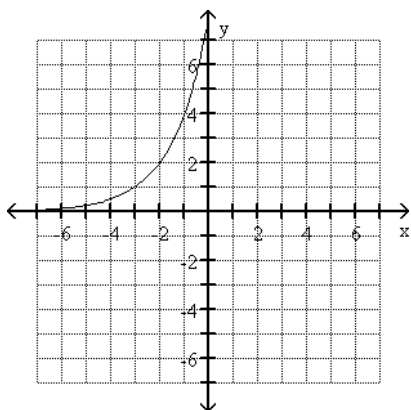


D)
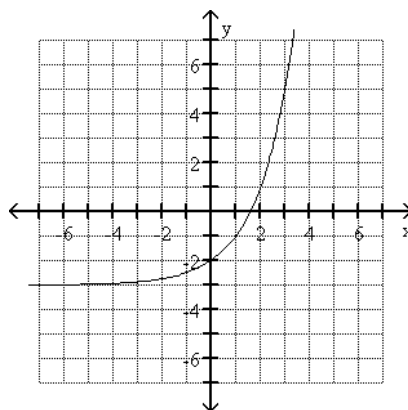


Use a calculator with a $\left[y^x\right]$ key or a $[^\wedge]$ key to solve the problem.

23) Research suggests that the probability of a certain fuse malfunctioning increases exponentially as     23) _____
the concentration of an impurity in the fuse increases. The probability is modeled by the function
$y = 5(257,967)^x$, where x is the impurity concentration, and y, given as a percent, is the probability
of the fuse malfunctioning. Find the probability of the fuse malfunctioning for an impurity
concentration of 0.12. Round to the nearest percent.

A) 15%               B) 4%               C) 31%               D) 22%

Solve the problem. Use a calculator with an LN or a LOG key.

24) The height in meters of girls of a certain tribe is approximated by h = 0.52 + 2 log (t/3) where t is the     24) _____
girl's age in years and 1 ≤ t ≤ 20. Estimate the height (to the nearest hundredth of a meter) of a girl
of the tribe 4 years of age.

A) 0.96 m               B) 0.77 m               C) 0.52 m               D) 1.12 m

Find the vertex for the parabola whose equation is given.

25) $y = x^2 - 2x - 4$     25) _____

A) (1, -7)               B) (-1, -1)               C) (-2, 4)               D) (1, -5)

9

Solve the problem.

26) The cost, in millions of dollars, for a company to manufacture x thousand automobiles is given by the function $C(x) = 4x^2 - 24x + 81$. Find the number of automobiles that must be produced to minimize cost.

26) _____

    A) 3 thousand automobiles             B) 12 thousand automobiles

    C) 45 thousand automobiles            D) 6 thousand automobiles

Express the fraction as a percent.

27) $\frac{51}{80}$

27) _____

    A) 15.69 %           B) 1.57 %           C) 6.38 %           D) 63.75 %

Write the decimal as a percent.

28) 3.4

28) _____

    A) 34%           B) 340%           C) 0.0034%           D) 0.34%

Express the percent as a decimal.

29) $\frac{8}{11}$%

29) _____

    A) 0.00073           B) 0.00727           C) 0.72727           D) 7.2727

Solve the problem.

30) 23 is 2% of what number?

30) _____

    A) 115           B) 46           C) 1150           D) 11,500

Use the table to calculate the income tax owed.

| | Unmarried, divorced, or legally separated | Married and each partner files a separate tax return | Married and both partners file a single tax return | Unmarried and paying more than half the cost of supporting a child or parent |
|---|---|---|---|---|
| **2005 MARGINAL TAX RATES, STANDARD DEDUCTIONS, AND EXEMPTIONS** | | | | |
| **Tax Rate** | **Single** | **Married Filing Separately** | **Married Filing Jointly** | **Head of Household** |
| 10% | up to $7300 | up to $7300 | up to $14,600 | up to $10,450 |
| 15% | $7301 to $29,700 | $7301 to $29,700 | $14,601 to $59,400 | $10,451 to $39,800 |
| 25% | $29,701 to $71,950 | $29,701 to $59,975 | $59,401 to $119,950 | $39,801 to $102,800 |
| 28% | $71,951 to $150,150 | $59,976 to $91,400 | $119,951 to $182,800 | $102,801 to $166,450 |
| 33% | $150,151 to $326,450 | $91,401 to $163,225 | $182,801 to $326,450 | $166,451 to $326,450 |
| 35% | more than $326,450 | more than $163,225 | more than $326,450 | more than $326,450 |
| Standard Deduction | $5000 | $5000 | $10,000 | $7300 |
| Exemptions (per person) | $3200 | $3200 | $3200 | $3200 |

31) Married couple filing jointly with two dependent children                                          31) _____
   Gross Income: $94,000
   Adjustments:  None
   Deductions:
           $12,000 mortgage interest
           $5000 charitable contributions
           $2500 student loan interest
   Tax credit: $2000
   A) $6755             B) $15,425             C) $13,425             D) $8755

The principal P is borrowed at simple interest rate r for a period of time t. Find the simple interest owed for the use of the money. Assume 360 days in a year and round answer to the nearest cent.

32) P = $500.00                                                                                         32) _____
   r = 8%
   t = 3 months
      A) $620.00             B) $510.00             C) $120.00             D) $10.00

The principal P is borrowed at simple interest rate r for a period of time t. Find the loan's future value, A, or the total amount due at time t. Round answer to the nearest cent.

33) P = $800.00                                                                                         33) _____
   r = 8%
   t = 10 months
      A) $1440.00             B) $1053.33             C) $853.33             D) $858.33

11

The principle represents an amount of money deposited in a savings account subject to compound interest at the rate shown. Use the formula

$$A = P(1 + \frac{r}{n})^{nt}$$

to find how much money will be in the account after the given number of years and how much interest was earned in that period.

34) principal: $10,000    34) _____
   rate: 4%
   compounding periods per year: 2
   time: 3 years

   A) amount in account: $11,248.64; interest earned: $1248.64

   B) amount in account: $12,653.19; interest earned: $2653.19

   C) amount in account: $10,612.08; interest earned: $612.08

   D) amount in account: $11,261.62; interest earned: $1261.62

Solve the problem using the present value formula $P = \dfrac{A}{(1 + \frac{r}{n})^{nt}}$.

35) How much money should be deposited today in an account that earns 11% compounded quarterly    35) _____
   so that it will accumulate to $8600 in 12 years?

   A) $2458.23          B) $2338.68          C) $31,624.69          D) $6261.32

Solve using the formula for the effective annual yield, $y = (1 + \frac{r}{n})^{n} - 1$.

36) A passbook savings account has a rate of 13%. Find the effective annual yield if the interest is    36) _____
   compounded monthly.

   A) 13.8%          B) 13.6%          C) 13.9%          D) 13.7%

Use the formula $A = \dfrac{P[(1 + r)^t - 1]}{r}$ or $A = \dfrac{P\left[\left(1 + \frac{r}{n}\right)^{nt} - 1\right]}{\frac{r}{n}}$ to find the value of the annuity.

37)    37) _____

| Periodic Deposit | Rate | Time |
|---|---|---|
| $1000 at the end of each year | 6% compounded annually | 13 years |

   A) $3353.66          B) $35,548.80          C) $16,869.94          D) $18,882.14

Use the formula $P = \dfrac{A\left(\frac{r}{n}\right)}{\left[\left(1 + \frac{r}{n}\right)^{nt} - 1\right]}$ to determine the periodic deposit.

38)    38) _____

| Periodic Deposit | Rate | Time | Financial Goal |
|---|---|---|---|
| $? at the end of every six months | 10% compounded semiannually | 8 years | $350,000 |

   A) $7268.91          B) $30,605.40          C) $14,794.47          D) $36,652.63

Solve the problem. Round answers to the nearest dollar.

39) The cost of a home entertainment center is $3800. We can finance this by paying $300 down and $309.17 per month for 12 months. Determine a. the amount financed; b. the total installment price; c. the finance charge.

39) _____

   A) a. amount financed: $3800; b. total installment price: $3975; c. finance charge: $175

   B) a. amount financed: $3500; b. total installment price: $3975; c. finance charge: $175

   C) a. amount financed: $3500; b. total installment price: $4010; c. finance charge: $210

   D) a. amount financed: $3500; b. total installment price: $4010; c. finance charge: $510

Solve the problem.

40) The finance charge per $100 financed for a stove that is paid off in 24 equal monthly payments is $11.45. Use an APR table to find the APR for this loan.

40) _____

   A) 10.5%           B) 11%           C) 14.13%           D) 14%

Use dimensional analysis to convert the quantity to the indicated units. If necessary, round the answer to two decimal places.

41) 36,960 ft to mi

41) _____

   A) 8 mi           B) 184.8 mi           C) 7 mi           D) 7.50 mi

Convert the given measurement to the unit indicated.

42) 2.58 m to hm

42) _____

   A) 0.258 hm           B) 25.8 hm           C) 0.0258 hm           D) 258 hm

Use dimensional analysis to convert the unit indicated.

43) 39 km to mi

43) _____

   A) 0.041 mi           B) 0.016 mi           C) 62.4 mi           D) 24.4 mi

Use dimensional analysis to convert the given square unit to the square unit indicated. Where necessary, round the answer to two decimal places.

44) 12 $mi^2$ to $km^2$

44) _____

   A) 31.2 $km^2$           B) 7.50 $km^2$           C) 4.62 $km^2$           D) 19.2 $km^2$

Use dimensional analysis to convert the given unit to the unit indicated. Where necessary, round answer to two decimal places.

45) 2079 $in.^3$ to gal

45) _____

   A) 480,249 gal           B) 9 gal           C) 67.32 gal           D) 1800 gal

Convert the given unit of weight to the unit indicated.

46) 0.064 mg to g

46) _____

   A) 0.00064 g           B) 0.0064 g           C) 64 g           D) 0.000064 g

Convert as indicated.

47) 350 kg to $cm^3$

47) _____

   A) 35,000 $cm^3$           B) 350,000 $cm^3$           C) 0.35 $cm^3$           D) 3.5 $cm^3$

Use dimensional analysis to convert the given quantity to the units indicated. When necessary, round answers to two decimal places.

48) 420 kg to lb                                                                                                    48) _____

    A) 466.67 lb             B) 189 lb             C) 933.33 lb             D) 378 lb

Convert the given Celsius temperature to its equivalent temperature on the Fahrenheit scale. Where appropriate, round to the nearest tenth of a degree.

49) -4°C                                                                                                            49) _____

    A) -39.2°F             B) 29.8°F             C) -20°F             D) 24.8°F

Convert the given Fahrenheit temperature to its equivalent temperature on the Celsius scale. Where appropriate, round to the nearest tenth of a degree.

50) -35°F                                                                                                           50) _____

    A) -37.2°C             B) -31.0°C             C) -51.4°C             D) -1.7°C