Math 1050 - College Algebra
Practice Problems for the Final

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

Solve the problem.
1) This chart shows the fees for an 18-hole round of golf for each of the last 5 years at a local   1) _____
municipal golf course. Assume that this chart defines a function with the name of f. Find the value
of x when f(x) = $24.

Year	Fee
2008	$22
2009	$24
2010	$26
2011	$26
2012	$27

    A) 2009   B) 2012   C) 2010   D) 2011

Find the slope of the line through the pair of points.
2) (-3, -5) and (-8, -4)   2) _____

    A) $\frac{1}{5}$ B) -5   C) $-\frac{1}{5}$ D) 5

Solve the problem.
3) The relationship between the number of units sold by a company and the profit is linear. If 9 units   3) _____
sold results in $342 profit and 42 units sold results in $1596 profit, find the marginal profit.

    A) -$38 per unit   B) $76 per unit   C) $38 per unit   D) $19.00 per unit

Write the slope-intercept form of the equation for the line passing through the given pair of points.
4) (-6, 4) and (5, 1)   4) _____

    A) $y = -\frac{3}{11}x + \frac{26}{11}$ B) $y = \frac{5}{2}x + \frac{27}{2}$ C) $y = \frac{3}{11}x + \frac{26}{11}$ D) $y = -\frac{5}{2}x + \frac{27}{2}$

Find the zero of f(x).
5) f(x) = 6x + 12   5) _____

    A) -2   B) 2   C) -12   D) 12

Solve the problem.
6) A repair company's charge for repairing a certain type of copy machine fits the model   6) _____
y = 47.38 + 0.617x where y is the number of dollars charged and x is the number of minutes the
repair person is on the job. How many minutes would it take for the cost of repair to reach $140?
(Round to the nearest minute.)

    A) 150 min   B) 15 min   C) 219 min   D) 304 min

Find the linear function that is the best fit for the given data. Round decimal values to the nearest hundredth, if
necessary.

7)
x	1	2	3	4	5	6
y	17	20	19	22	21	24

    7) _____

    A) y = 1.03x + 18.9   B) y = 1.17x + 16.4   C) y = 1.03x + 16.4   D) y = 1.17x + 18.9

Solve the problem.

8) The paired data below consist of the test scores of 6 randomly selected students and the number of   8) _____
hours they studied for the test. The linear model for this data is $y = 67.3 + 1.07x$, where x is number
of hours studied and y is score on the test. Use this model to predict the score on the test of a
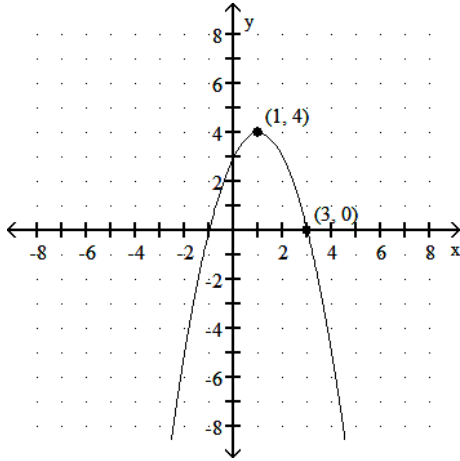student who studies 2 hours.

Hours	5	10	4	6	10	9
Score	64	86	69	86	59	87

A) 70.3   B) 69.4   C) 64.4   D) 74.4

Provide an appropriate response.

9) Write the equation of the quadratic function whose graph is shown.   9) _____

A) $y = -(x - 1)^2 + 4$ B) $y = (x - 1)^2 + 4$
C) $y = -2(x - 1)^2 + 4$ D) $y = -(x + 1)^2 + 4$

Determine if the vertex of the graph is a maximum point or a minimum point.

10) $f(x) = -4x^2 - 3x - 8$ 10) _____
A) Maximum   B) Minimum

Solve the problem.

11) John owns a hot dog stand. His profit, in dollars, is given by the equation $P(x) = P = -x^2 + 14x + 54$,   11) _____
where x is the number of hot dogs sold. What is the most he can earn?
A) $49   B) $103   C) $117   D) $75

Use factoring to solve the equation.

12) $2k^2 - 7k - 4 = 0$ 12) _____

A) $-\frac{1}{2}, 2$ B) $\frac{1}{7}, -\frac{1}{2}$ C) $-2, 4$ D) $-\frac{1}{2}, 4$

Use the quadratic formula to solve the equation.

13) $p^2 + 5p - 5 = 0$ 13) _____

A) $\frac{-5 \pm 3\sqrt{5}}{2}$ B) $-5 \pm 3\sqrt{5}$ C) $\frac{5 + 3\sqrt{5}}{2}$ D) $\frac{-5 - 3\sqrt{5}}{2}$

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Solve the problem.

14) Suppose that y varies directly as the 3/2 power of x, and that y = 192 when x = 16. Find y when x = 9.   14) _____

   A) 81   B) 48   C) 3   D) 192

15) The number of mice in an old barn after the cats are removed can be roughly estimated with the following function: $y = 2.325x^{0.79} + 0.25x + 1$, where y is the number of mice and x is the number of weeks since a cat lived in the barn. Predict the number of mice there will be in ten weeks if you get rid of the cat in the barn.   15) _____

   A) 18 mice   B) 15 mice   C) 17 mice   D) 22 mice

Fill in each blank with the appropriate response.

16) The graph of $y = -6(x - 4)^2 + 8$ can be obtained from the graph of $y = x^2$ by shifting horizontally _____ units to the _____ , vertically stretching by a factor of _____ , reflecting across the ___ -axis, and shifting vertically _____ units in the _____ direction.   16) _____

   A) 4; left; 6; x; 8; upward   B) 4; right; 8; y; 6; downward
   C) 4; right; 6; x; 8; upward   D) 4; right; 8; x; 6; upward

Find the requested composition of functions.

17) Given $f(x) = 4x^2 + 3x + 6$ and $g(x) = 3x - 8$, find $(g \circ f)(x)$.   17) _____

   A) $12x^2 + 9x + 26$ B) $12x^2 + 9x + 10$ C) $4x^2 + 9x + 10$ D) $4x^2 + 3x - 2$

Find the requested function value.

18) Find $(f \circ g)(-5)$ when $f(x) = -5x + 9$ and $g(x) = 6x^2 - 8x + 8$.   18) _____

   A) -60   B) 6672   C) -981   D) -81

Solve the problem.

19) A balloon in the shape of a sphere is deflating. Given that t represents the time, in minutes, since it began losing air, the radius of the balloon (in cm) is r(t) = 16 - t. Let the equation $V(r) = \frac{4}{3}\pi r^3$ represent the volume of a sphere of radius r. Find and interpret $(V \circ r)(t)$.   19) _____

   A) $(V \circ r)(t) = 16 - \frac{4}{3}\pi(16 - t)^3$; This is the volume of the air lost by the balloon (in cm³) as a function of time (in minutes).

   B) $(V \circ r)(t) = \frac{4}{3}\pi(16 - t)^3$; This is the volume of the air lost by the balloon (in cm³) as a function of time (in minutes).

   C) $(V \circ r)(t) = \frac{4}{3}\pi(16 - t)^3$; This is the volume of the balloon (in cm³) as a function of time (in minutes).

   D) $(V \circ r)(t) = \frac{4}{3}\pi(t - 16)^3$; This is the volume of the balloon (in cm³) as a function of time (in minutes).

20) Assume that the profit P made when t units are sold, t > 0, is given by $P(t) = t^2 - 22t + 96$. For what values of t will there be a profit (that is, P > 0)?   20) _____

   A) t = 22   B) t = 6 or t = 16
   C) 6 < t < 16   D) 0 < t < 6 or t > 16

21) The growth in the population of a certain rodent at a dump site fits the exponential function 21) _____
   $A(t) = 708e^{0.024t}$, where t is the number of years since 1988. Estimate the population in the year
   2000.
     A) 472   B) 944   C) 725   D) 967

Rewrite as a single logarithm.
22) $(\log_m m - \log_m n) + 2 \log_m k$ 22) _____

     A) $\log_m \dfrac{m}{k^2 n}$ B) $\log_m \dfrac{2mk}{n}$ C) $\log_m \dfrac{mk^2}{n}$ D) $\log_m mk^2 n$

Solve the equation.
23) $3^{(4x - 2)} = 22$ Round to three decimal places.   23) _____
     A) 0.998   B) 2.333   C) 0.203   D) 1.203

Solve the equation. Give an exact solution.
24) $\log (x + 3) = 1 - \log x$ 24) _____
     A) -5, 2   B) -2   C) 2   D) -2, 5

Solve the problem.
25) Find the amount of money in an account after 10 years if $1100 is deposited at 8% annual interest 25) _____
   compounded annually.
     A) $2410.24   B) $2374.82   C) $2441.60   D) $2428.84

26) In order to purchase a home, a family borrows $80,000 at an annual interest rate of 9%, to be paid 26) _____
   back over a 25 year period in equal monthly payments. Find the total amount paid to the finance
   company for the life of the loan. Round your answer the nearest dollar.
     A) $193,138   B) $180,000   C) $186,503   D) $201,407

27) A pharmaceutical company introduces a new headache medication on the market. They advertise 27) _____
   the product on television and find that the percentage P of people who buy the product after t
   weeks satisfies the function $P(t) = \dfrac{100\%}{1 + 45e^{-0.16t}}$. What percentage buy the product after 9 weeks?

   Round to the nearest tenth of a percent when necessary.
     A) 10.3%   B) 9.4%   C) 8.6%   D) 6.9%

28) The table below gives the violent crime rate (per 100,000 people) for a particular state every five   28) _____
years from 1970 to 2010.

Year	Violent Crime Rate
1970	4.8
1975	5.0
1980	5.9
1985	7.3
1990	8.9
1995	10.4
2000	11.6
2005	12.3
2010	12.1

Use technology to find the cubic function that is the best fit for this data, where x is the number of
years after 1970. Round to five decimal places.

A) $y = -0.00024x^3 + 0.02250x^2 - 0.03111x + 4.68687$

B) $y = -0.00034x^3 + 0.01950x^2 - 0.04893x + 4.79798$

C) $y = -0.00053x^3 + 0.02460x^2 - 0.01893x + 5.79798$

D) $y = 4.79798x^3 - 0.04893x^2 + 0.01950x - 0.00034$

Find all rational zeros of the polynomial function.

29) $f(x) = 3x^3 + 10x^2 - 27x - 10$ 29) _____

A) -5, 2, -1   B) 5, -2, $\frac{1}{3}$ C) 5, -2, 1   D) -5, 2, -$\frac{1}{3}$

Provide an appropriate response.

30) If Q varies inversely as the square root of R and Q = 5 when R = 9, what is Q when R is 16?   30) _____

A) 11.25   B) 60   C) 6.66666667   D) 3.75

Solve the problem.

31) In the following formula, y is the minimum number of hours of studying required to attain a test   31) _____
score of x: $y = \frac{0.41x}{100.5 - x}$. How many hours of study are needed to score 85? Round to the nearest

hundredth if necessary.

A) 2.25 hr   B) 101.01 hr   C) 22.50 hr   D) 5.18 hr

Find the solution or solutions, if any exist, to the system.

32) $\begin{cases} 7x + 7y + z = 1 \\ x + 8y + 8z = 8 \\ 9x + y + 9z = 9 \end{cases}$ 32) _____

A) x = -1, y = 1, z = 1   B) x = 1, y = -1, z = 1

C) x = 0, y = 0, z = 1   D) x = 0, y = 1, z = 0

Solve the problem.

33) Some people must eat a low-sodium diet with no more than 2000 mg of sodium per day. By eating 1 cracker, 1 pretzel, and 1 cookie, a person would ingest 149 mg of sodium. If a person ate 8 pretzels and 8 cookies, he or she would ingest 936 mg of sodium. By eating 6 crackers and 7 pretzels, a person would take in 535 mg of sodium. Which of the following statements is true?
   A) A cracker contains more sodium than a cookie
   B) A pretzel contains 49 mg of sodium.
   C) A cookie contains 71 mg of sodium.
   D) A cracker contains 30 mg of sodium.

33) _____

34) Barnes and Able are partners that sell life, health, and auto insurance. The tables below show their sales figures for May and June. Find the matrix that gives total sales for the two months.

34) _____

May Sales ($)

	Life	Health	Auto
Able	20,000	15,000	8000
Barnes	30,000	0	17,000

June Sales ($)

	Life	Health	Auto
Able	70,000	0	30,000
Barnes	20,000	23,000	32,000

A) $\begin{bmatrix} 140,000 & 23,000 & 49,000 \end{bmatrix}$

B) $\begin{bmatrix} 90,000 & 15,000 & 38,000 \\ 50,000 & 23,000 & 49,000 \end{bmatrix}$

C) $\begin{bmatrix} 90,000 & 0 & 38,000 \\ 50,000 & 0 & 49,000 \end{bmatrix}$

D) $\begin{bmatrix} 90,000 & 15,000 & 38,000 \\ 50,000 & 23,000 & 32,000 \end{bmatrix}$

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

We have encoded a message by assigning the numbers 1 - 26 to the letters a - z of the alphabet, respectively, and assigning 27 to a blank space. We have further encoded it by using an encoding matrix. Decode this message by finding the inverse of the encoding matrix and multiplying it times the coded message.

35) The encoding matrix is A = $\begin{bmatrix} 1 & 1 \\ 3 & 2 \end{bmatrix}$ and the encoded message is 29, 63, 28, 72, 10, 21, 41, 96, 29, 67.

35) _____

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

Solve the system.

36) $\begin{cases} xy - x^2 = -20 \\ x - 2y = 3 \end{cases}$

36) _____

   A) $(5, 1), \left(-8, -\dfrac{11}{2}\right)$ B) $(5, 1), \left(-\dfrac{11}{2}, -8\right)$ C) $(-5, -1), \left(\dfrac{11}{2}, 8\right)$ D) $(5, -1), \left(8, \dfrac{11}{2}\right)$

Solve.

37) An open topped box with a square base will have volume of 2560 cubic inches and uses 896 square inches of material. What are the dimensions of the box?
   A) 21 in. by 21 in. by 5 in.   B) 8 in. by 8 in. by 40 in.
   C) 32 in. by 32 in. by 2.5 in.   D) 16 in. by 16 in. by 10 in.

37) _____

Write the inequalities that describe the constraints on production.

38) The Acme Class Ring Company designs and sells two types of rings: the VIP and the SST. The company can produce up to 24 rings each day, using up to 60 total man-hours of labor. It takes 3 man-hours to make one VIP ring and 2 man-hours to make one SST ring. Let x represent the number of VIP rings, and let y represent the number of SST rings.
   A) x + y ≤ 24, 2x + 3y ≤ 60, x ≥ 0, y ≥ 0   B) 0 ≤ x ≤ 24, 0 ≤ y ≤ 24, 3x + 2y ≤ 60
   C) 0 ≤ x ≤ 24, 0 ≤ y ≤ 24, 2x + 3y ≤ 60   D) x + y ≤ 24, 3x + 2y ≤ 60, x ≥ 0, y ≥ 0

38) _____

Solve the problem.

39) Find the values of x and y that give the minimum possible value of $f = 6x + 8y$ subject to the   39) _____
following constraints:

$$\begin{cases} 2x + 4y \geq 12 \\ 2x + y \geq 8 \\ x \geq 0, y \geq 0 \end{cases}$$

A) $x = \dfrac{10}{3}, y = \dfrac{4}{3}$ B) $x = 0, y = 3$ C) $x = 6, y = 0$ D) $x = 0, y = 0$

40) Zach is planning to invest up to $40,000 in corporate and municipal bonds. The least he will invest   40) _____
in corporate bonds is $8000 and he does not want to invest more than $26,000 in corporate bonds.
He also does not want to invest more than $27,567 in municipal bonds. The interest is 7.9% on
corporate bonds and 6.4% on municipal bonds. This is simple interest for one year. What is the
maximum income?

A) $13,158   B) $2950   C) $28,950   D) $16,950

41) Find the 15th term of the arithmetic sequence with first term 8 and common difference $\dfrac{1}{2}$.   41) _____

A) $\dfrac{1}{2}$ B) $\dfrac{31}{2}$ C) 15   D) 1

42) Find the 5th term of the geometric sequence with first term $\dfrac{1}{2}$ and common ratio $\dfrac{1}{4}$.   42) _____

A) $\dfrac{1}{2048}$ B) $\dfrac{1}{64}$ C) $\dfrac{1}{512}$ D) $\dfrac{1}{32}$

43) Eloise contracts to work for 13 days, receiving $0.02 the first day, $0.06 the second day, $0.18 the   43) _____
third day, and so on, with each day's pay triple that of the previous day. How much will she earn
on the last day of the contract?

A) $81.92   B) $5314.41   C) $31,886.46   D) $10,628.82

44) Find the sum of the first 10 terms of the arithmetic sequence with first term -11 and common   44) _____
difference 11.

A) 385   B) 440   C) -440   D) -605

45) Find the sum of the first 5 terms of the geometric sequence with first term 2 and common ratio -4.   45) _____
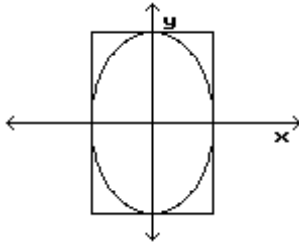
A) 410   B) 682   C) -682   D) -410

Find the sum of the series, if possible.

46) $\sum\limits_{i=1}^{\infty} 2\left(\dfrac{1}{3}\right)^i$ 46) _____

A) 1   B) 2

C) Not possible, infinite   D) $\dfrac{3}{2}$

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Solve the problem.

47) An elliptical riding path is to be built on a rectangular piece of property that measures 8 mi by 4 mi.   47) _____
Find an equation for the ellipse if the path is to touch the center of the property line on all 4 sides

A) $\dfrac{x^2}{4} + \dfrac{y^2}{16} = 1$ B) $\dfrac{x^2}{64} + \dfrac{y^2}{4} = 1$ C) $\dfrac{x^2}{16} + \dfrac{y^2}{4} = 1$ D) $\dfrac{x^2}{4} + \dfrac{y^2}{64} = 1$

Find the center, foci, and asymptotes of the hyperbola.

48) $\dfrac{(y - 5)^2}{81} - \dfrac{(x - 1)^2}{144} = 1$ 48) _____

A) C: (1, 5); F: (5, -7), (5, 17); A: $y = \dfrac{9}{16}x - \dfrac{17}{48}$, $y = -\dfrac{9}{16}x - \dfrac{23}{48}$

B) C: (1, 5); F: (1, 20), (1, -10); A: $y = \dfrac{3}{4}x + \dfrac{17}{4}$, $y = -\dfrac{3}{4}x + \dfrac{23}{4}$

C) C: (1, 5); F: (5, -10), (5, 20); A: $y = \dfrac{3}{4}x - \dfrac{17}{4}$, $y = -\dfrac{3}{4}x - \dfrac{23}{4}$

D) C: (1, 5); F: (-7, 5), (17, 5); A: $y = \dfrac{9}{16}x - \dfrac{23}{48}$, $y = -\dfrac{9}{16}x - \dfrac{23}{48}$

Solve the problem.

49) The roof of a building is in the shape of the hyperbola $y^2 - x^2 = 30$, where x and y are in meters.   49) _____
Determine the distance, w, between the outside walls.

A = 10 m
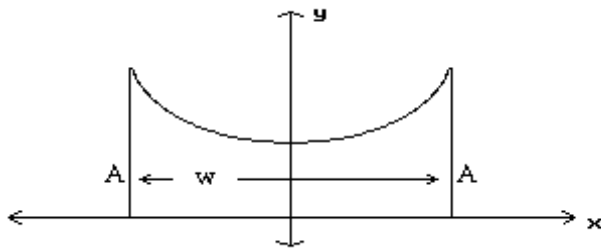
A) 8.35 m   B) 11.4 m   C) 16.7 m   D) 70 m

Find the center and radius of the circle.

50) $x^2 + y^2 - 8x - 10y + 32 = 0$ 50) _____
A) center: (5, 4); radius: 3   B) center: (-4, -5); radius: 9
C) center: (4, 5); radius: 3   D) center: (-5, -4); radius: 9

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