JEFFERSON MATH PROJECT
REGENTS AT RANDOM

The NY Algebra 2/Trigonometry Regents Exams
## Fall 2009-January 2012

www.jmap.org

Dear Sir

I have to acknolege the reciept of your favor of May 14. in which you mention that you have finished the 6. first books of Euclid, plane trigonometry, surveying & algebra and ask whether I think a further pursuit of that branch of science would be useful to you. there are some propositions in the latter books of Euclid, & some of Archimedes, which are useful, & I have no doubt you have been made acquainted with them. trigonometry, so far as this, is most valuable to every man, there is scarcely a day in which he will not resort to it for some of the purposes of common life. the science of calculation also is indispensible as far as the extraction of the square & cube roots; Algebra as far as the quadratic equation & the use of logarithms are often of value in ordinary cases: but all beyond these is but a luxury; a delicious luxury indeed; but not to be indulged in by one who is to have a profession to follow for his subsistence. in this light I view the conic sections, curves of the higher orders, perhaps even spherical trigonometry, Algebraical operations beyond the 2d dimension, and fluxions.
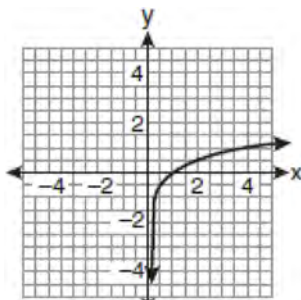
Letter from Thomas Jefferson to William G. Munford, Monticello, June 18, 1799.
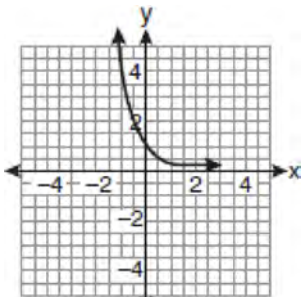
Algebra 2/Trigonometry Regents at Random

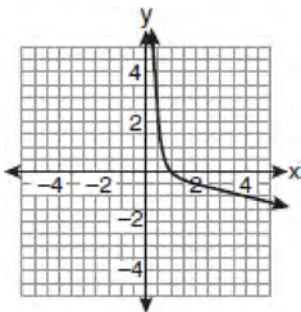1 If a function is defined by the equation $f(x) = 4^x$, which graph represents the inverse of this function?
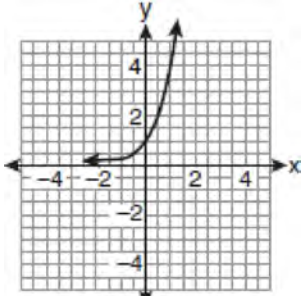
1)

2)

3)

4)

2 What is the conjugate of $-2 + 3i$?
1) $-3 + 2i$
2) $-2 - 3i$
3) $2 - 3i$
4) $3 + 2i$

3 The yearbook staff has designed a survey to learn student opinions on how the yearbook could be improved for this year. If they want to distribute this survey to 100 students and obtain the most reliable data, they should survey
1) every third student sent to the office
2) every third student to enter the library
3) every third student to enter the gym for the basketball game
4) every third student arriving at school in the morning

4 The roots of the equation $x^2 - 10x + 25 = 0$ are
1) imaginary
2) real and irrational
3) real, rational, and equal
4) real, rational, and unequal

5 Which formula can be used to determine the total number of different eight-letter arrangements that can be formed using the letters in the word *DEADLINE*?
1) $8!$
2) $\dfrac{8!}{4!}$
3) $\dfrac{8!}{2!+2!}$
4) $\dfrac{8!}{2!\cdot 2!}$

6 Find, to the *nearest tenth of a degree*, the angle whose measure is 2.5 radians.

7 The number of minutes students took to complete a quiz is summarized in the table below.

Minutes	14	15	16	17	18	19	20
Number of Students	5	3	x	5	2	10	1

If the mean number of minutes was 17, which equation could be used to calculate the value of x?

1) $17 = \dfrac{119 + x}{x}$

2) $17 = \dfrac{119 + 16x}{x}$

3) $17 = \dfrac{446 + x}{26 + x}$

4) $17 = \dfrac{446 + 16x}{26 + x}$

8 A survey completed at a large university asked 2,000 students to estimate the average number of hours they spend studying each week. Every tenth student entering the library was surveyed. The data showed that the mean number of hours that students spend studying was 15.7 per week. Which characteristic of the survey could create a bias in the results?
1) the size of the sample
2) the size of the population
3) the method of analyzing the data
4) the method of choosing the students who were surveyed

9 The expression $2\log x - (3\log y + \log z)$ is equivalent to

1) $\log \dfrac{x^2}{y^3 z}$

2) $\log \dfrac{x^2 z}{y^3}$

3) $\log \dfrac{2x}{3yz}$

4) $\log \dfrac{2xz}{3y}$

10 Which expression is equivalent to $\dfrac{\sqrt{3} + 5}{\sqrt{3} - 5}$?

1) $-\dfrac{14 + 5\sqrt{3}}{11}$

2) $-\dfrac{17 + 5\sqrt{3}}{11}$

3) $\dfrac{14 + 5\sqrt{3}}{14}$

4) $\dfrac{17 + 5\sqrt{3}}{14}$

11 A study shows that 35% of the fish caught in a local lake had high levels of mercury. Suppose that 10 fish were caught from this lake. Find, to the *nearest tenth of a percent,* the probability that *at least* 8 of the 10 fish caught did *not* contain high levels of mercury.

12 The table below shows the number of new stores in a coffee shop chain that opened during the years 1986 through 1994.

Year	Number of New Stores
1986	14
1987	27
1988	48
1989	80
1990	110
1991	153
1992	261
1993	403
1994	681

Using $x = 1$ to represent the year 1986 and y to represent the number of new stores, write the exponential regression equation for these data. Round all values to the *nearest thousandth.*

13 The expression $\dfrac{4}{5 - \sqrt{13}}$ is equivalent to

1) $\dfrac{4\sqrt{13}}{5\sqrt{13} - 13}$

2) $\dfrac{4(5 - \sqrt{13})}{38}$

3) $\dfrac{5 + \sqrt{13}}{3}$

4) $\dfrac{4(5 + \sqrt{13})}{38}$

14 Which two functions are inverse functions of each other?
1) $f(x) = \sin x$ and $g(x) = \cos(x)$
2) $f(x) = 3 + 8x$ and $g(x) = 3 - 8x$
3) $f(x) = e^x$ and $g(x) = \ln x$
4) $f(x) = 2x - 4$ and $g(x) = -\dfrac{1}{2}x + 4$

15 The expression $4ab\sqrt{2b} - 3a\sqrt{18b^3} + 7ab\sqrt{6b}$ is equivalent to
1) $2ab\sqrt{6b}$
2) $16ab\sqrt{2b}$
3) $-5ab + 7ab\sqrt{6b}$
4) $-5ab\sqrt{2b} + 7ab\sqrt{6b}$

16 Twenty different cameras will be assigned to several boxes. Three cameras will be randomly selected and assigned to box A. Which expression can be used to calculate the number of ways that three cameras can be assigned to box A?
1) $20!$
2) $\dfrac{20!}{3!}$
3) $_{20}C_3$
4) $_{20}P_3$

17 Express $\dfrac{\sqrt{108x^5y^8}}{\sqrt{6xy^5}}$ in simplest radical form.

18 The expression $\dfrac{a^2 b^{-3}}{a^{-4} b^2}$ is equivalent to

1) $\dfrac{a^6}{b^5}$

2) $\dfrac{b^5}{a^6}$

3) $\dfrac{a^2}{b}$

4) $a^{-2} b^{-1}$

19 In $\triangle ABC$, $m\angle A = 32$, $a = 12$, and $b = 10$. Find the measures of the missing angles and side of $\triangle ABC$. Round each measure to the *nearest tenth*.

20 The sides of a parallelogram measure 10 cm and 18 cm. One angle of the parallelogram measures 46 degrees. What is the area of the parallelogram, to the *nearest square centimeter*?
1) 65
2) 125
3) 129
4) 162

21 Express the sum $7 + 14 + 21 + 28 + \ldots + 105$ using sigma notation.

22 Write the binomial expansion of $(2x - 1)^5$ as a polynomial in simplest form.

23 When $x^{-1} - 1$ is divided by $x - 1$, the quotient is
1) -1
2) $-\dfrac{1}{x}$
3) $\dfrac{1}{x^2}$
4) $\dfrac{1}{(x-1)^2}$

24 A circle shown in the diagram below has a center of $(-5, 3)$ and passes through point $(-1, 7)$.
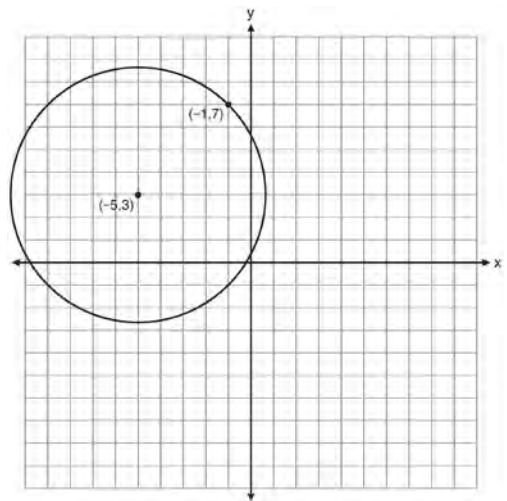
Write an equation that represents the circle.

25 The conjugate of $7 - 5i$ is
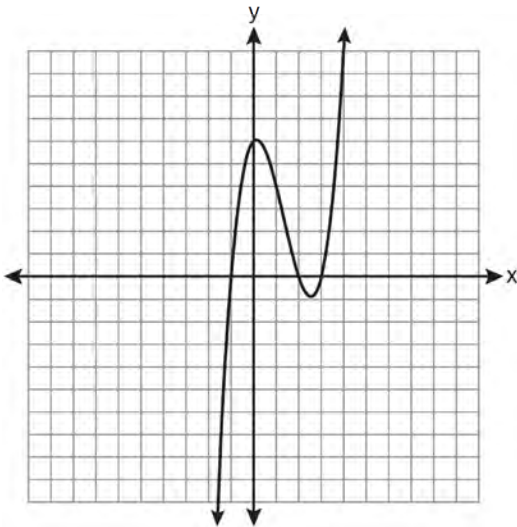1) $-7 - 5i$
2) $-7 + 5i$
3) $7 - 5i$
4) $7 + 5i$

4

26 What is the fifteenth term of the geometric
sequence $-\sqrt{5}, \sqrt{10}, -2\sqrt{5}, \ldots$?
1) $-128\sqrt{5}$
2) $128\sqrt{10}$
3) $-16384\sqrt{5}$
4) $16384\sqrt{10}$

27 The roots of the equation $9x^2 + 3x - 4 = 0$ are
1) imaginary
2) real, rational, and equal
3) real, rational, and unequal
4) real, irrational, and unequal

28 The graph of $y = x^3 - 4x^2 + x + 6$ is shown below.

What is the product of the roots of the equation
$x^3 - 4x^2 + x + 6 = 0$?
1) -36
2) -6
3) 6
4) 4

29 Solve the equation $2\tan C - 3 = 3\tan C - 4$
algebraically for all values of C in the interval
$0° \le C < 360°$.

30 If $\log x^2 - \log 2a = \log 3a$, then $\log x$ expressed in
terms of $\log a$ is equivalent to
1) $\frac{1}{2}\log 5a$
2) $\frac{1}{2}\log 6 + \log a$
3) $\log 6 + \log a$
4) $\log 6 + 2\log a$

31 The table below shows the results of an experiment
involving the growth of bacteria.

Time (x) (in minutes)	1	3	5	7	9	11
Number of Bacteria (y)	2	25	81	175	310	497

Write a power regression equation for this set of
data, rounding all values to *three decimal places*.
Using this equation, predict the bacteria's growth,
to the *nearest integer*, after 15 minutes.

32 Which task is *not* a component of an observational
study?
1) The researcher decides who will make up the
sample.
2) The researcher analyzes the data received from
the sample.
3) The researcher gathers data from the sample,
using surveys or taking measurements.
4) The researcher divides the sample into two
groups, with one group acting as a control
group.

33 The expression $\dfrac{2x+4}{\sqrt{x+2}}$ is equivalent to

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

2) $\dfrac{(2x+4)\sqrt{x-2}}{x-4}$

3) $2\sqrt{x-2}$

4) $2\sqrt{x+2}$

34 Find the sum and product of the roots of the equation $5x^2 + 11x - 3 = 0$.

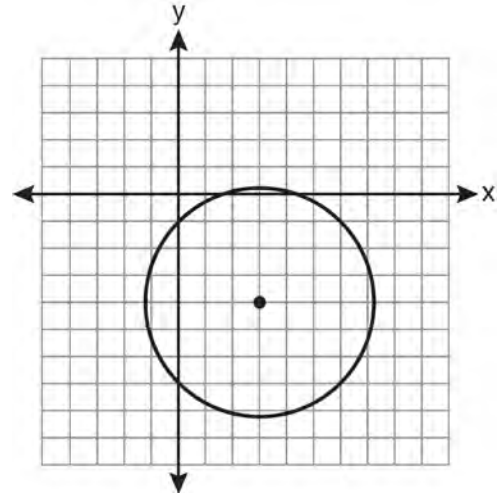35 The value of $\tan 126°43'$ to the *nearest ten-thousandth* is
1) -1.3407
2) -1.3408
3) -1.3548
4) -1.3549

36 The value of x in the equation $4^{2x+5} = 8^{3x}$ is
1) 1
2) 2
3) 5
4) -10

37 Evaluate: $10 + \displaystyle\sum_{n=1}^{5}(n^3 - 1)$

38 Which equation represents the circle shown in the graph below that passes through the point $(0,-1)$?

1) $(x-3)^2 + (y+4)^2 = 16$
2) $(x-3)^2 + (y+4)^2 = 18$
3) $(x+3)^2 + (y-4)^2 = 16$
4) $(x+3)^2 + (y-4)^2 = 18$

39 What is the common ratio of the geometric sequence whose first term is 27 and fourth term is 64?

1) $\dfrac{3}{4}$

2) $\dfrac{64}{81}$

3) $\dfrac{4}{3}$

4) $\dfrac{37}{3}$

40 Use the discriminant to determine all values of k that would result in the equation $x^2 - kx + 4 = 0$ having equal roots.

41 The function $f(x) = \tan x$ is defined in such a way that $f^{-1}(x)$ is a function. What can be the domain of $f(x)$?
1) $\{x \,|\, 0 \le x \le \pi\}$
2) $\{x \,|\, 0 \le x \le 2\pi\}$
3) $\left\{x \,|\, -\dfrac{\pi}{2} < x < \dfrac{\pi}{2}\right\}$
4) $\left\{x \,|\, -\dfrac{\pi}{2} < x < \dfrac{3\pi}{2}\right\}$

42 The expression $\cos^2 \theta - \cos 2\theta$ is equivalent to
1) $\sin^2 \theta$
2) $-\sin^2 \theta$
3) $\cos^2 \theta + 1$
4) $-\cos^2 \theta - 1$

43 What is the conjugate of $\dfrac{1}{2} + \dfrac{3}{2}i$?
1) $-\dfrac{1}{2} + \dfrac{3}{2}i$
2) $\dfrac{1}{2} - \dfrac{3}{2}i$
3) $\dfrac{3}{2} + \dfrac{1}{2}i$
4) $-\dfrac{1}{2} - \dfrac{3}{2}i$

44 For which equation does the sum of the roots equal -3 and the product of the roots equal 2?
1) $x^2 + 2x - 3 = 0$
2) $x^2 - 3x + 2 = 0$
3) $2x^2 + 6x + 4 = 0$
4) $2x^2 - 6x + 4 = 0$

45 In $\triangle ABC$, $m\angle A = 74$, $a = 59.2$, and $c = 60.3$. What are the two possible values for $m\angle C$, to the *nearest tenth*?
1) 73.7 and 106.3
2) 73.7 and 163.7
3) 78.3 and 101.7
4) 78.3 and 168.3

46 A population of single-celled organisms was grown in a Petri dish over a period of 16 hours. The number of organisms at a given time is recorded in the table below.

Time, hrs (x)	Number of Organisms (y)
0	25
2	36
4	52
6	68
8	85
10	104
12	142
16	260

Determine the exponential regression equation model for these data, rounding all values to the *nearest ten-thousandth*. Using this equation, predict the number of single-celled organisms, to the *nearest whole number*, at the end of the 18th hour.

47 Express $\left(\dfrac{2}{3}x - 1\right)^2$ as a trinomial.

48 What is the principal value of $\cos^{-1}\left(-\dfrac{\sqrt{3}}{2}\right)$?

1) $-30°$
2) $60°$
3) $150°$
4) $240°$

49 If $a = 3$ and $b = -2$, what is the value of the expression $\dfrac{a^{-2}}{b^{-3}}$?

1) $-\dfrac{9}{8}$

2) -1

3) $-\dfrac{8}{9}$

4) $\dfrac{8}{9}$

50 Factored completely, the expression $12x^4 + 10x^3 - 12x^2$ is equivalent to

1) $x^2(4x + 6)(3x - 2)$
2) $2(2x^2 + 3x)(3x^2 - 2x)$
3) $2x^2(2x - 3)(3x + 2)$
4) $2x^2(2x + 3)(3x - 2)$

51 What is the range of $f(x) = |x - 3| + 2$?
1) $\{x \,|\, x \ge 3\}$
2) $\{y \,|\, y \ge 2\}$
3) $\{x \,|\, x \in \text{real numbers}\}$
4) $\{y \,|\, y \in \text{real numbers}\}$

52 Which equation is sketched in the diagram below?
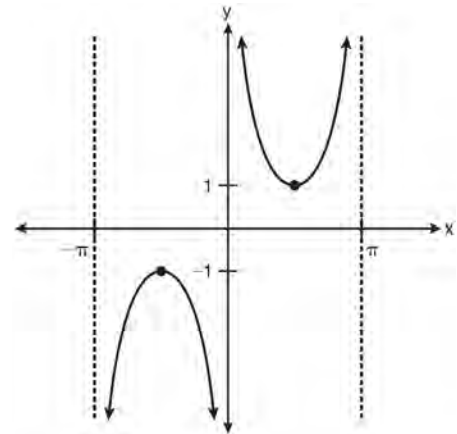
1) $y = \csc x$
2) $y = \sec x$
3) $y = \cot x$
4) $y = \tan x$

53 Given $\triangle ABC$ with $a = 9$, $b = 10$, and $m\angle B = 70$, what type of triangle can be drawn?
1) an acute triangle, only
2) an obtuse triangle, only
3) both an acute triangle and an obtuse triangle
4) neither an acute triangle nor an obtuse triangle

54 What is the radian measure of the smaller angle formed by the hands of a clock at 7 o'clock?

1) $\dfrac{\pi}{2}$

2) $\dfrac{2\pi}{3}$

3) $\dfrac{5\pi}{6}$

4) $\dfrac{7\pi}{6}$

55 The roots of the equation $2x^2 + 7x - 3 = 0$ are

1) $-\dfrac{1}{2}$ and -3

2) $\dfrac{1}{2}$ and 3

3) $\dfrac{-7 \pm \sqrt{73}}{4}$

4) $\dfrac{7 \pm \sqrt{73}}{4}$

56 Which equation is graphed in the diagram below?

(15,8)
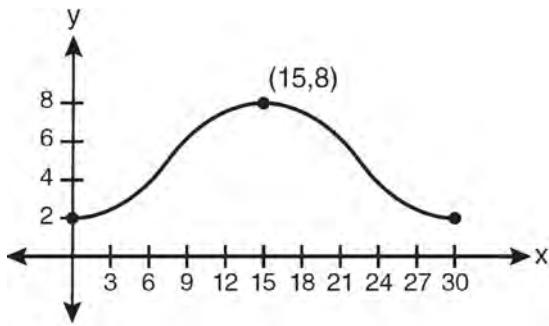
1) $y = 3\cos\left(\dfrac{\pi}{30}x\right) + 8$

2) $y = 3\cos\left(\dfrac{\pi}{15}x\right) + 5$

3) $y = -3\cos\left(\dfrac{\pi}{30}x\right) + 8$

4) $y = -3\cos\left(\dfrac{\pi}{15}x\right) + 5$

57 Express $\dfrac{5}{3 - \sqrt{2}}$ with a rational denominator, in simplest radical form.

58 A dartboard is shown in the diagram below. The two lines intersect at the center of the circle, and the central angle in sector 2 measures $\dfrac{2\pi}{3}$.
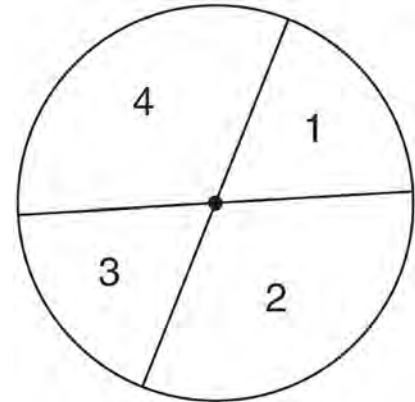
If darts thrown at this board are equally likely to land anywhere on the board, what is the probability that a dart that hits the board will land in either sector 1 or sector 3?

1) $\dfrac{1}{6}$

2) $\dfrac{1}{3}$

3) $\dfrac{1}{2}$

4) $\dfrac{2}{3}$

59 In parallelogram $BFLO$, $OL = 3.8$, $LF = 7.4$, and $m\angle O = 126$. If diagonal $\overline{BL}$ is drawn, what is the area of $\triangle BLF$?
1) 11.4
2) 14.1
3) 22.7
4) 28.1

60 For a given set of rectangles, the length is inversely proportional to the width. In one of these rectangles, the length is 12 and the width is 6. For this set of rectangles, calculate the width of a rectangle whose length is 9.

61 In which graph is θ coterminal with an angle of $-70°$?
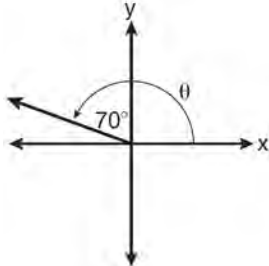
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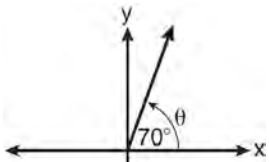
2)
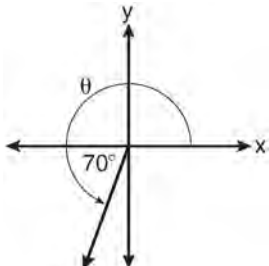
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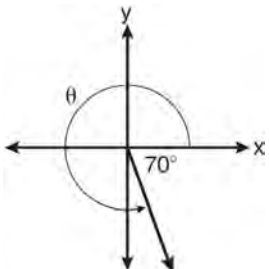
4)

62 In $\triangle ABC$, $a = 15$, $b = 14$, and $c = 13$, as shown in the diagram below. What is the $m\angle C$, to the *nearest degree*?
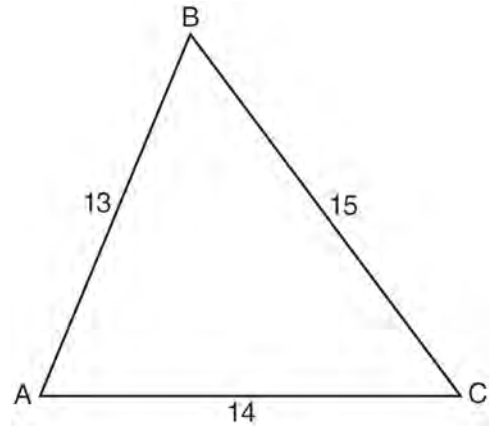
1) 53
2) 59
3) 67
4) 127

63 What is the period of the function
$$y = \frac{1}{2}\sin\left(\frac{x}{3} - \pi\right)?$$

1) $\dfrac{1}{2}$

2) $\dfrac{1}{3}$

3) $\dfrac{2}{3}\pi$

4) 6π

64 Solve algebraically for x: $16^{2x+3} = 64^{x+2}$

65 The temperature, T, of a given cup of hot chocolate after it has been cooling for t minutes can best be modeled by the function below, where T_0 is the temperature of the room and k is a constant.
$$\ln(T - T_0) = -kt + 4.718$$
A cup of hot chocolate is placed in a room that has a temperature of 68°. After 3 minutes, the temperature of the hot chocolate is 150°. Compute the value of k to the nearest thousandth. [Only an algebraic solution can receive full credit.] Using this value of k, find the temperature, T, of this cup of hot chocolate if it has been sitting in this room for a total of 10 minutes. Express your answer to the *nearest degree*. [Only an algebraic solution can receive full credit.]

66 A spinner is divided into eight equal sections. Five sections are red and three are green. If the spinner is spun three times, what is the probability that it lands on red *exactly* twice?

1) $\dfrac{25}{64}$

2) $\dfrac{45}{512}$

3) $\dfrac{75}{512}$

4) $\dfrac{225}{512}$

67 If $\sin^{-1}\left(\dfrac{5}{8}\right) = A$, then

1) $\sin A = \dfrac{5}{8}$

2) $\sin A = \dfrac{8}{5}$

3) $\cos A = \dfrac{5}{8}$

4) $\cos A = \dfrac{8}{5}$

68 Which graph does *not* represent a function?
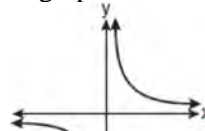
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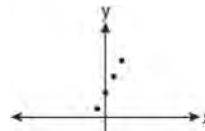
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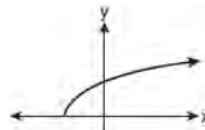
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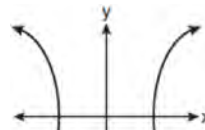
4)

69 What is the radian measure of an angle whose measure is −420°?

1) $-\dfrac{7\pi}{3}$

2) $-\dfrac{7\pi}{6}$

3) $\dfrac{7\pi}{6}$

4) $\dfrac{7\pi}{3}$

70 Solve algebraically for x: $\log_{x+3}\dfrac{x^3 + x - 2}{x} = 2$

11

71 Which expression represents the third term in the expansion of $(2x^4 - y)^3$?

1) $-y^3$
2) $-6x^4 y^2$
3) $6x^4 y^2$
4) $2x^4 y^2$

72 On the axes below, for $-2 \le x \le 2$, graph $y = 2^{x+1} - 3$.
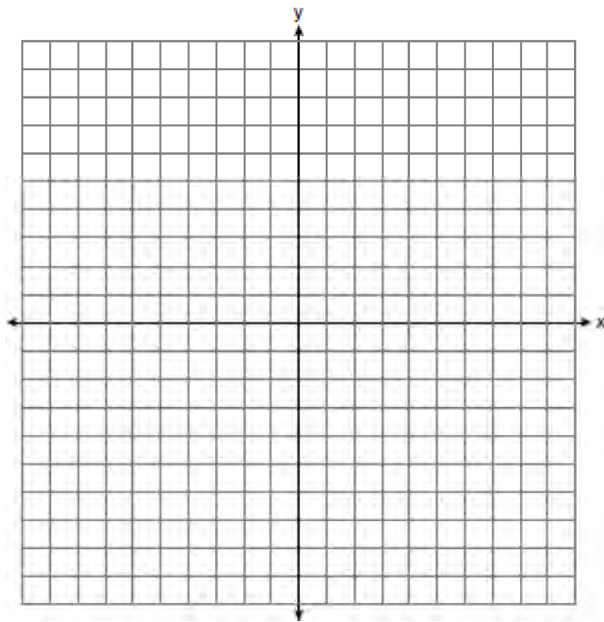
73 A four-digit serial number is to be created from the digits 0 through 9. How many of these serial numbers can be created if 0 can *not* be the first digit, no digit may be repeated, and the last digit must be 5?

1) 448
2) 504
3) 2,240
4) 2,520

74 Express $5\sqrt{3x^3} - 2\sqrt{27x^3}$ in simplest radical form.

75 How many distinct triangles can be formed if $m\angle A = 35$, $a = 10$, and $b = 13$?

1) 1
2) 2
3) 3
4) 0

76 The minimum point on the graph of the equation $y = f(x)$ is $(-1, -3)$. What is the minimum point on the graph of the equation $y = f(x) + 5$?

1) $(-1, 2)$
2) $(-1, -8)$
3) $(4, -3)$
4) $(-6, -3)$

77 The solution set of $\sqrt{3x + 16} = x + 2$ is

1) $\{-3, 4\}$
2) $\{-4, 3\}$
3) $\{3\}$
4) $\{-4\}$

78 The equation $y - 2\sin\theta = 3$ may be rewritten as

1) $f(y) = 2\sin x + 3$
2) $f(y) = 2\sin\theta + 3$
3) $f(x) = 2\sin\theta + 3$
4) $f(\theta) = 2\sin\theta + 3$

79 Which graph represents the equation $y = \cos^{-1} x$?
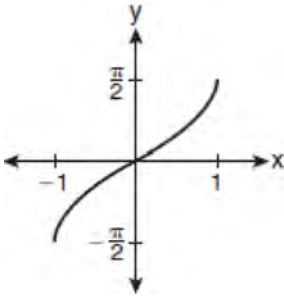
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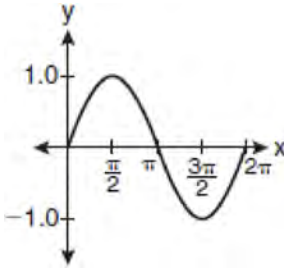
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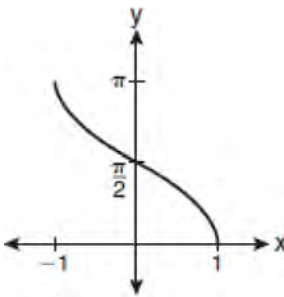
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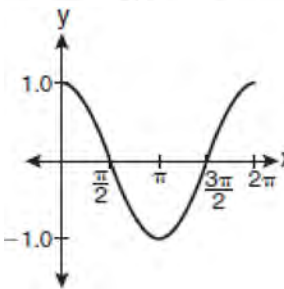
4)

80 If p varies inversely as q, and $p = 10$ when $q = \dfrac{3}{2}$,

what is the value of p when $q = \dfrac{3}{5}$?

1) 25
2) 15
3) 9
4) 4

81 Which expression, when rounded to three decimal places, is equal to -1.155?

1) $\sec\left(\dfrac{5\pi}{6}\right)$

2) $\tan(49°20')$

3) $\sin\left(-\dfrac{3\pi}{5}\right)$

4) $\csc(-118°)$

82 The solutions of the equation $y^2 - 3y = 9$ are

1) $\dfrac{3 \pm 3i\sqrt{3}}{2}$

2) $\dfrac{3 \pm 3i\sqrt{5}}{2}$

3) $\dfrac{-3 \pm 3\sqrt{5}}{2}$

4) $\dfrac{3 \pm 3\sqrt{5}}{2}$

83 The letters of any word can be rearranged. Carol believes that the number of different 9-letter arrangements of the word "TENNESSEE" is greater than the number of different 7-letter arrangements of the word "VERMONT." Is she correct? Justify your answer.

84 What is the value of x in the equation $9^{3x+1} = 27^{x+2}$?

1) 1

2) $\dfrac{1}{3}$

3) $\dfrac{1}{2}$

4) $\dfrac{4}{3}$

85 On January 1, a share of a certain stock cost $180. Each month thereafter, the cost of a share of this stock decreased by one-third. If x represents the time, in months, and y represents the cost of the stock, in dollars, which graph best represents the cost of a share over the following 5 months?

1)

2)

3)

4)
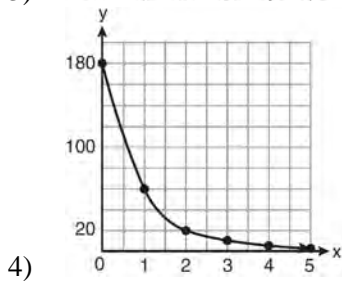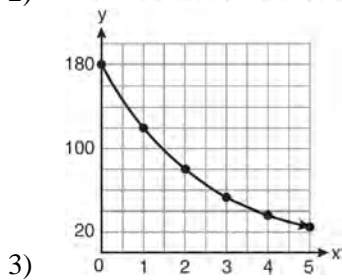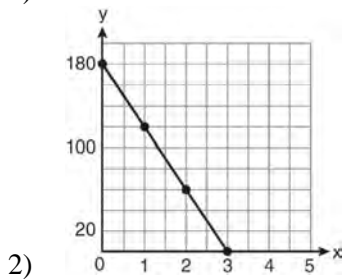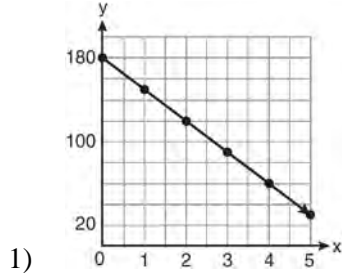
86 The fraction $\dfrac{3}{\sqrt{3a^2 b}}$ is equivalent to

1) $\dfrac{1}{a\sqrt{b}}$

2) $\dfrac{\sqrt{b}}{ab}$

3) $\dfrac{\sqrt{3b}}{ab}$

4) $\dfrac{\sqrt{3}}{a}$

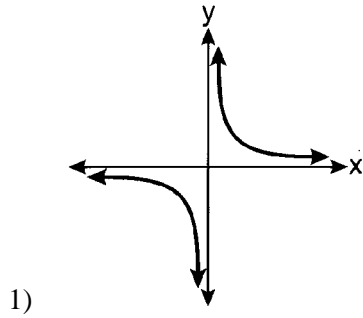87 Which ratio represents $\csc A$ in the diagram below?
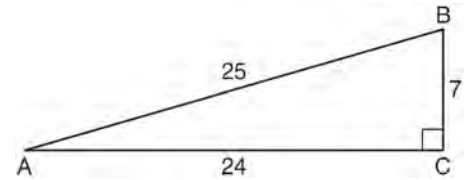
1) $\dfrac{25}{24}$

2) $\dfrac{25}{7}$

3) $\dfrac{24}{7}$

4) $\dfrac{7}{24}$

88 An amateur bowler calculated his bowling average for the season. If the data are normally distributed, about how many of his 50 games were within one standard deviation of the mean?
1) 14
2) 17
3) 34
4) 48

89 Which graph represents a relation that is *not* a function?

1)

2)

3)

4)
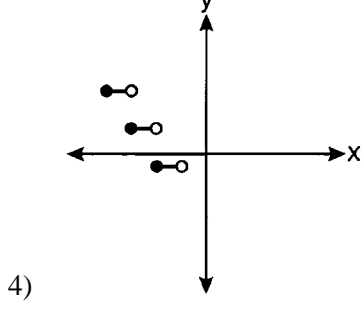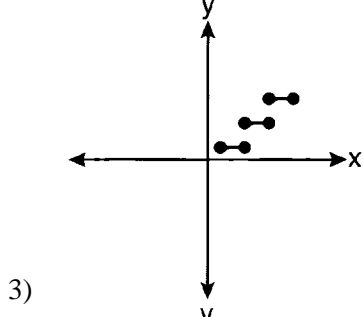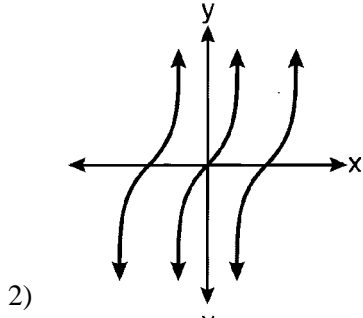
90 The expression $x^{-\frac{2}{5}}$ is equivalent to

1) $-\sqrt[2]{x^5}$

2) $-\sqrt[5]{x^2}$

3) $\dfrac{1}{\sqrt[2]{x^5}}$

4) $\dfrac{1}{\sqrt[5]{x^2}}$

91 Evaluate: $\displaystyle\sum_{n=1}^{3}(-n^4 - n)$

92 What are the sum and product of the roots of the equation $6x^2 - 4x - 12 = 0$?

1) sum $= -\dfrac{2}{3}$; product $= -2$

2) sum $= \dfrac{2}{3}$; product $= -2$

3) sum $= -2$; product $= \dfrac{2}{3}$

4) sum $= -2$; product $= -\dfrac{2}{3}$

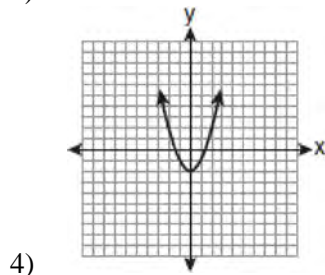93 Find the first four terms of the recursive sequence defined below.
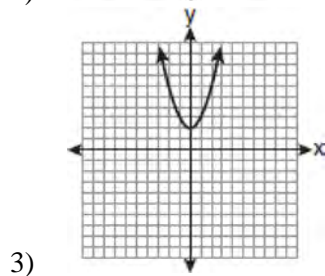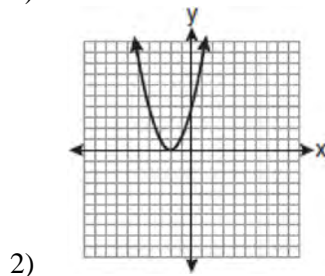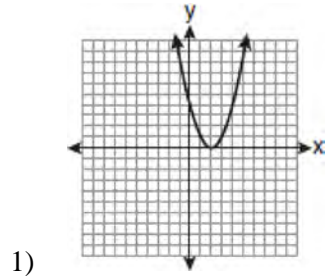
$$a_1 = -3$$

$$a_n = a_{(n-1)} - n$$

94 Starting with $\sin^2 A + \cos^2 A = 1$, derive the formula $\tan^2 A + 1 = \sec^2 A$.

95   The graph below shows the function f(x).
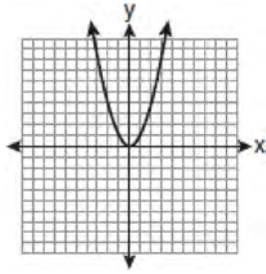
Which graph represents the function f(x + 2)?

1)

2)

3)

4)

96   Find all values of θ in the interval $0° \leq \theta < 360°$ that satisfy the equation $\sin 2\theta = \sin \theta$.

97   A committee of 5 members is to be randomly selected from a group of 9 teachers and 20 students. Determine how many different committees can be formed if 2 members must be teachers and 3 members must be students.

98   Howard collected fish eggs from a pond behind his house so he could determine whether sunlight had an effect on how many of the eggs hatched. After he collected the eggs, he divided them into two tanks. He put both tanks outside near the pond, and he covered one of the tanks with a box to block out all sunlight. State whether Howard's investigation was an example of a controlled experiment, an observation, or a survey. Justify your response.

99   Find the total number of different twelve-letter arrangements that can be formed using the letters in the word *PENNSYLVANIA*.
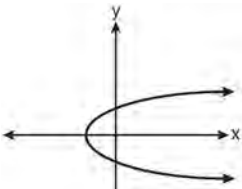
100   If $x^2 + 2 = 6x$ is solved by completing the square, an intermediate step would be

1) $(x + 3)^2 = 7$
2) $(x - 3)^2 = 7$
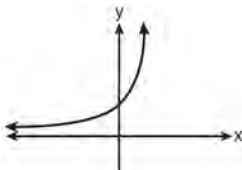3) $(x - 3)^2 = 11$
4) $(x - 6)^2 = 34$

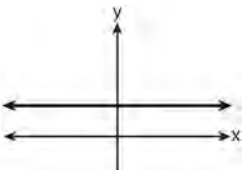101 Which graph represents a one-to-one function?
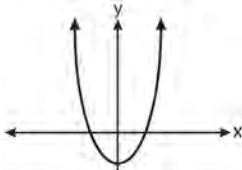
1)

2)

3)

4)

102 An auditorium has 21 rows of seats. The first row
has 18 seats, and each succeeding row has two
more seats than the previous row. How many seats
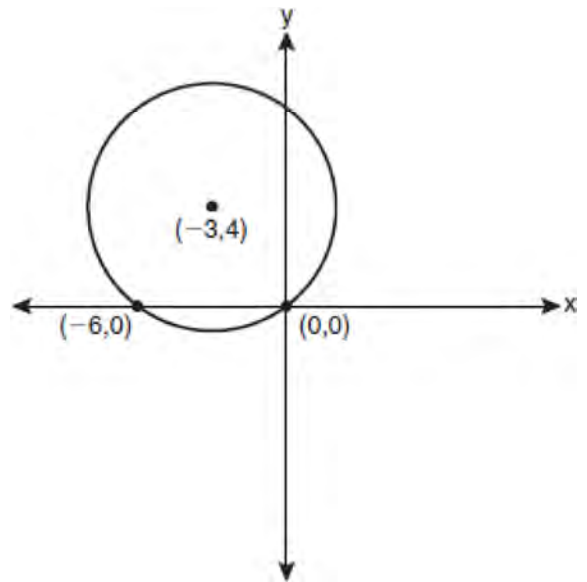are in the auditorium?
1)   540
2)   567
3)   760
4)   798

103 In $\triangle ABC$, $a = 3$, $b = 5$, and $c = 7$. What is m$\angle C$?
1)   22
2)   38
3)   60
4)   120

104 A circle has a radius of 4 inches. In inches, what is
the length of the arc intercepted by a central angle
of 2 radians?
1) 2π
2)   2
3) 8π
4)   8

105 Write an equation of the circle shown in the graph
below.

106 If θ is an angle in standard position and its terminal
side passes through the point $(-3,2)$, find the exact
value of csc θ.
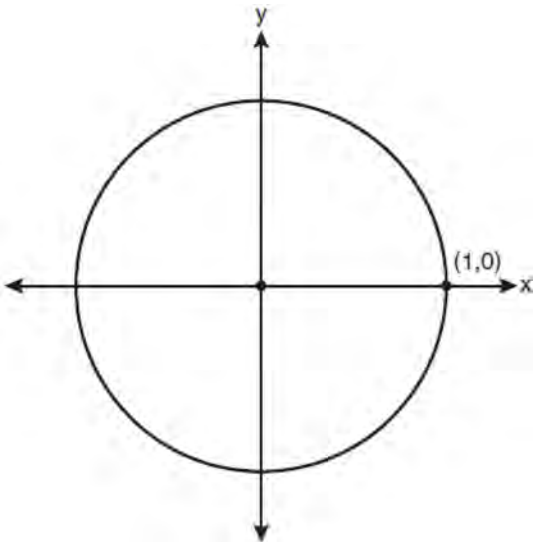
107 What is the value of x in the equation $\log_5 x = 4$?

  1) 1.16
  2) 20
  3) 625
  4) 1,024

108 What is the range of $f(x) = (x+4)^2 + 7$?

  1) $y \geq -4$
  2) $y \geq 4$
  3) $y = 7$
  4) $y \geq 7$

109 On the unit circle shown in the diagram below, sketch an angle, in standard position, whose degree measure is 240 and find the exact value of $\sin 240°$.

110 Find, to the *nearest minute*, the angle whose measure is 3.45 radians.

111 Expressed as a function of a positive acute angle, $\cos(-305°)$ is equal to

  1) $-\cos 55°$
  2) $\cos 55°$
  3) $-\sin 55°$
  4) $\sin 55°$

112 The value of the expression $\sum\limits_{r=3}^{5}(-r^2 + r)$ is

  1) -38
  2) -12
  3) 26
  4) 62

113 The principal would like to assemble a committee of 8 students from the 15-member student council. How many different committees can be chosen?

  1) 120
  2) 6,435
  3) 32,432,400
  4) 259,459,200

114 Which arithmetic sequence has a common difference of 4?

  1) $\{0, 4n, 8n, 12n, \dots\}$
  2) $\{n, 4n, 16n, 64n, \dots\}$
  3) $\{n+1, n+5, n+9, n+13, \dots\}$
  4) $\{n+4, n+16, n+64, n+256, \dots\}$

18

115 The expression $(x^2 - 1)^{-\frac{2}{3}}$ is equivalent to

1) $\sqrt[3]{(x^2 - 1)^2}$

2) $\dfrac{1}{\sqrt[3]{(x^2 - 1)^2}}$

3) $\sqrt{(x^2 - 1)^3}$

4) $\dfrac{1}{\sqrt{(x^2 - 1)^3}}$

116 What is the period of the function $f(\theta) = -2\cos 3\theta$?

1) π

2) $\dfrac{2\pi}{3}$

3) $\dfrac{3\pi}{2}$

4) 2π

117 A doctor wants to test the effectiveness of a new drug on her patients. She separates her sample of patients into two groups and administers the drug to only one of these groups. She then compares the results. Which type of study *best* describes this situation?

1) census

2) survey

3) observation

4) controlled experiment

118 What is the common difference of the arithmetic sequence $5, 8, 11, 14$?

1) $\dfrac{8}{5}$

2) -3

3) 3

4) 9

119 In the diagram below of a unit circle, the ordered pair $\left(-\dfrac{\sqrt{2}}{2}, -\dfrac{\sqrt{2}}{2}\right)$ represents the point where the terminal side of θ intersects the unit circle.
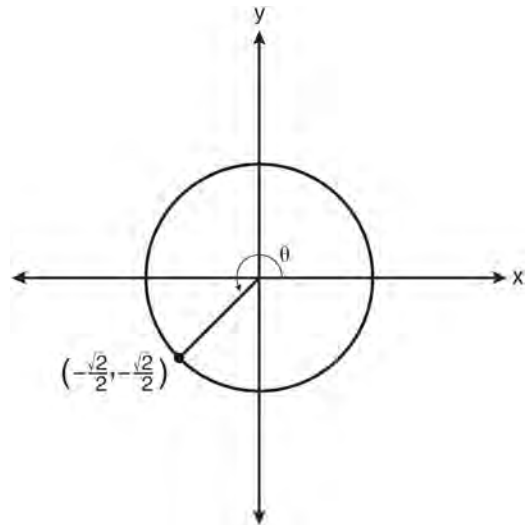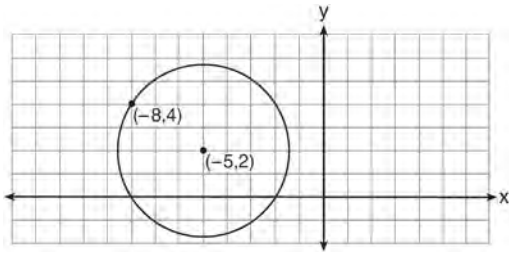

What is m$\angle\theta$?

1) 45

2) 135

3) 225

4) 240

120 The expression $(3 - 7i)^2$ is equivalent to

1) $-40 + 0i$

2) $-40 - 42i$

3) $58 + 0i$

4) $58 - 42i$

121 What is the fifteenth term of the sequence $5, -10, 20, -40, 80, \ldots$?

1) $-163,840$

2) $-81,920$

3) $81,920$

4) $327,680$

122 Write an equation of the circle shown in the diagram below.

123 What is the solution of the equation $2\log_4(5x) = 3$?

1) 6.4
2) 2.56
3) $\dfrac{9}{5}$
4) $\dfrac{8}{5}$

124 Which function is *not* one-to-one?

1) $\{(0,1),(1,2),(2,3),(3,4)\}$
2) $\{(0,0),(1,1),(2,2),(3,3)\}$
3) $\{(0,1),(1,0),(2,3),(3,2)\}$
4) $\{(0,1),(1,0),(2,0),(3,2)\}$

125 Written in simplest form, the expression $\dfrac{\dfrac{x}{4} - \dfrac{1}{x}}{\dfrac{1}{2x} + \dfrac{1}{4}}$ is

equivalent to

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

126 The diagram below shows the plans for a cell phone tower. A guy wire attached to the top of the tower makes an angle of 65 degrees with the ground. From a point on the ground 100 feet from the end of the guy wire, the angle of elevation to the top of the tower is 32 degrees. Find the height of the tower, to the *nearest foot*.
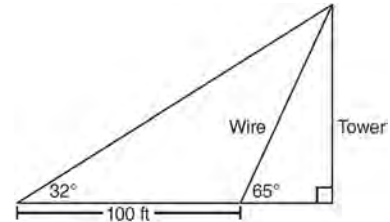
127 Which equation is represented by the graph below?

1) $y = \cot x$
2) $y = \csc x$
3) $y = \sec x$
4) $y = \tan x$

20
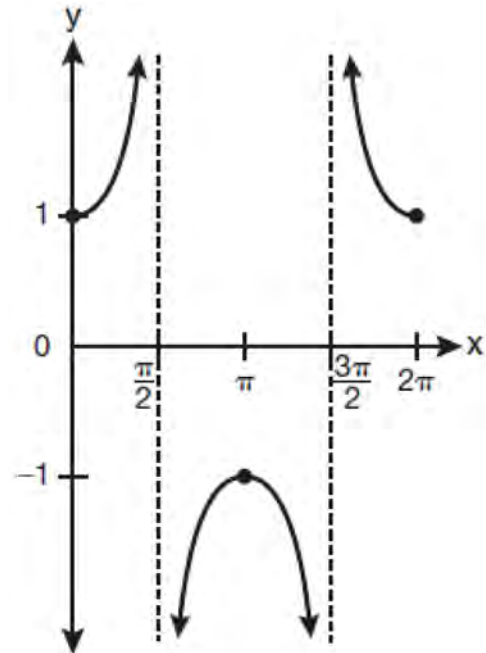
128 Solve algebraically for x: $4 - \sqrt{2x - 5} = 1$

129 What is the number of degrees in an angle whose radian measure is $\frac{11\pi}{12}$?
1) 150
2) 165
3) 330
4) 518

130 Evaluate $e^{x \ln y}$ when $x = 3$ and $y = 2$.

131 Solve $2x^2 - 12x + 4 = 0$ by completing the square, expressing the result in simplest radical form.

132 If $f(x) = \frac{x}{x^2 - 16}$, what is the value of $f(-10)$?
1) $-\frac{5}{2}$
2) $-\frac{5}{42}$
3) $\frac{5}{58}$
4) $\frac{5}{18}$

133 Solve the following systems of equations algebraically: $5 = y - x$

$4x^2 = -17x + y + 4$

134 Factored completely, the expression $6x - x^3 - x^2$ is equivalent to
1) $x(x + 3)(x - 2)$
2) $x(x - 3)(x + 2)$
3) $-x(x - 3)(x + 2)$
4) $-x(x + 3)(x - 2)$

135 What is the product of $\left(\frac{x}{4} - \frac{1}{3}\right)$ and $\left(\frac{x}{4} + \frac{1}{3}\right)$?
1) $\frac{x^2}{8} - \frac{1}{9}$
2) $\frac{x^2}{16} - \frac{1}{9}$
3) $\frac{x^2}{8} - \frac{x}{6} - \frac{1}{9}$
4) $\frac{x^2}{16} - \frac{x}{6} - \frac{1}{9}$

136 What is the formula for the nth term of the sequence $54, 18, 6, \ldots$?
1) $a_n = 6\left(\frac{1}{3}\right)^n$
2) $a_n = 6\left(\frac{1}{3}\right)^{n-1}$
3) $a_n = 54\left(\frac{1}{3}\right)^n$
4) $a_n = 54\left(\frac{1}{3}\right)^{n-1}$

137 Two sides of a parallelogram are 24 feet and 30 feet. The measure of the angle between these sides is 57°. Find the area of the parallelogram, to the *nearest square foot*.

138 Factor the expression $12t^8 - 75t^4$ completely.

139 The solution set of $4^{x^2 + 4x} = 2^{-6}$ is
1) $\{1,3\}$
2) $\{-1,3\}$
3) $\{-1,-3\}$
4) $\{1,-3\}$

140 What is a formula for the nth term of sequence B shown below?
$$B = 10, 12, 14, 16, \ldots$$
1) $b_n = 8 + 2n$
2) $b_n = 10 + 2n$
3) $b_n = 10(2)^n$
4) $b_n = 10(2)^{n-1}$

141 Which expression always equals 1?
1) $\cos^2 x - \sin^2 x$
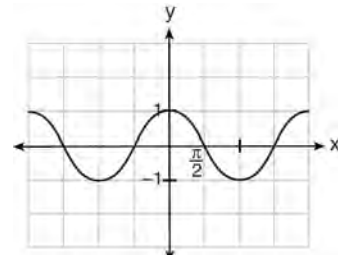2) $\cos^2 x + \sin^2 x$
3) $\cos x - \sin x$
4) $\cos x + \sin x$

142 The solution set of the inequality $x^2 - 3x > 10$ is
1) $\{x \mid -2 < x < 5\}$
2) $\{x \mid 0 < x < 3\}$
3) $\{x \mid x < -2 \text{ or } x > 5\}$
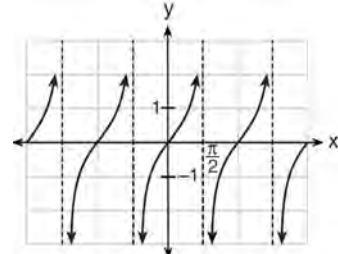4) $\{x \mid x < -5 \text{ or } x > 2\}$

143 A sequence has the following terms: $a_1 = 4$, $a_2 = 10$, $a_3 = 25$, $a_4 = 62.5$. Which formula represents the nth term in the sequence?
1) $a_n = 4 + 2.5n$
2) $a_n = 4 + 2.5(n - 1)$
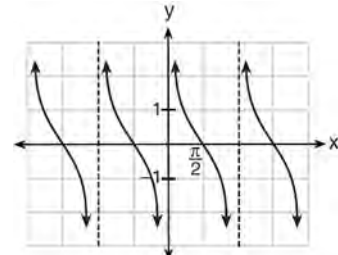3) $a_n = 4(2.5)^n$
4) $a_n = 4(2.5)^{n-1}$

144 Which is a graph of $y = \cot x$?

1)

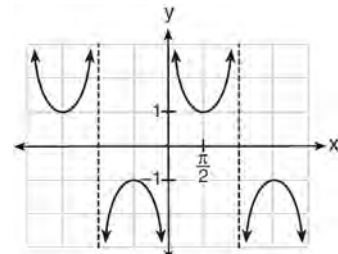

2)

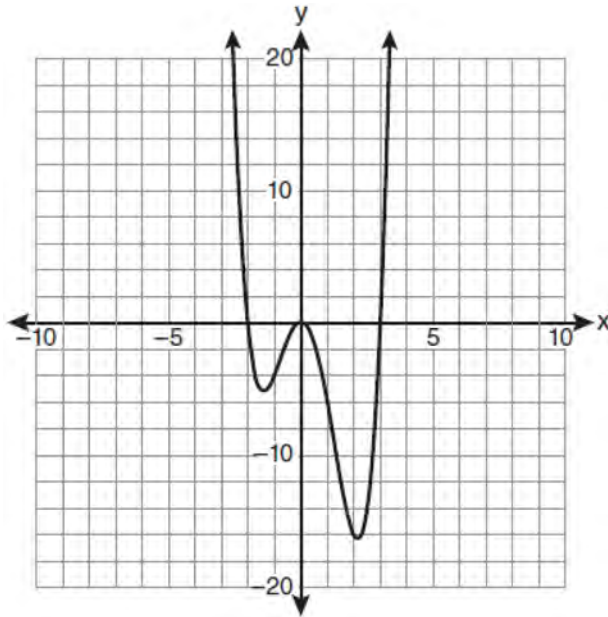3)

4)

145 What is the solution set of the equation $3x^5 - 48x = 0$?
1) $\{0, \pm 2\}$
2) $\{0, \pm 2, 3\}$
3) $\{0, \pm 2, \pm 2i\}$
4) $\{\pm 2, \pm 2i\}$

146 The graph of $y = f(x)$ is shown below.

Which set lists all the real solutions of $f(x) = 0$?
1) $\{-3, 2\}$
2) $\{-2, 3\}$
3) $\{-3, 0, 2\}$
4) $\{-2, 0, 3\}$

147 Simplify the expression $\dfrac{3x^{-4}y^5}{(2x^3y^{-7})^{-2}}$ and write the answer using only positive exponents.

148 For which equation does the sum of the roots equal $\dfrac{3}{4}$ and the product of the roots equal -2?
1) $4x^2 - 8x + 3 = 0$
2) $4x^2 + 8x + 3 = 0$
3) $4x^2 - 3x - 8 = 0$
4) $4x^2 + 3x - 2 = 0$

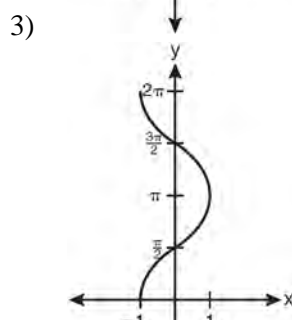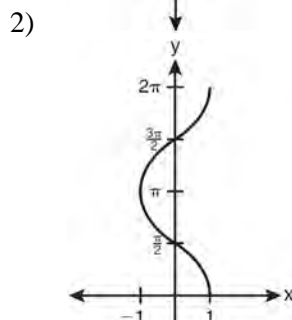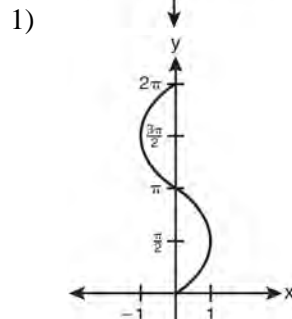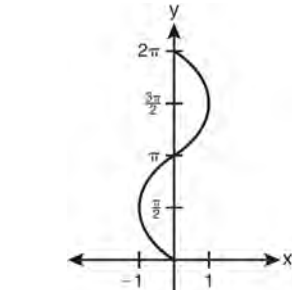149 The table below shows the first-quarter averages for Mr. Harper's statistics class.

Statistics Class Averages

Quarter Averages	Frequency
99	1
97	5
95	4
92	4
90	7
87	2
84	6
81	2
75	1
70	2
65	1

What is the population variance for this set of data?
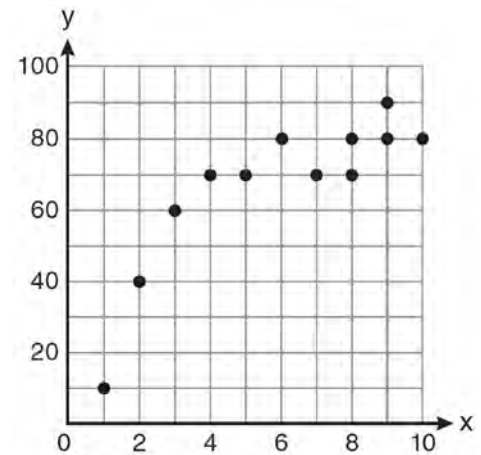1) 8.2
2) 8.3
3) 67.3
4) 69.3

150 Which graph shows $y = \cos^{-1} x$?

1)

2)

3)

4)

151 Brian correctly used a method of completing the square to solve the equation $x^2 + 7x - 11 = 0$. Brian's first step was to rewrite the equation as $x^2 + 7x = 11$. He then added a number to both sides of the equation. Which number did he add?

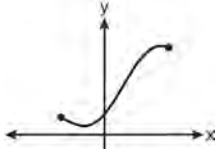1) $\dfrac{7}{2}$

2) $\dfrac{49}{4}$

3) $\dfrac{49}{2}$

4) 49

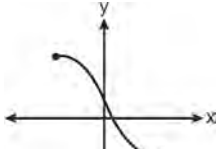152 Samantha constructs the scatter plot below from a set of data.

Based on her scatter plot, which regression model would be most appropriate?
1) exponential
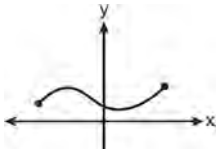2) linear
3) logarithmic
4) power

24

153 Which graph does *not* represent a function?

1)

2)

3)
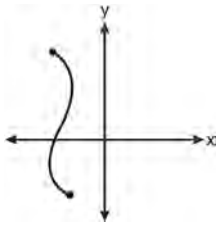
4)

154 Write a quadratic equation such that the sum of its roots is 6 and the product of its roots is −27.

155 The product of i^7 and i^5 is equivalent to
1) 1
2) −1
3) i
4) $-i$

156 Find the solution of the inequality $x^2 - 4x > 5$, algebraically.

157 What is the coefficient of the fourth term in the expansion of $(a - 4b)^9$?
1) −5,376
2) −336
3) 336
4) 5,376

158 If $f(x) = x^2 - 6$, find $f^{-1}(x)$.

159 If the amount of time students work in any given week is normally distributed with a mean of 10 hours per week and a standard deviation of 2 hours, what is the probability a student works between 8 and 11 hours per week?
1) 34.1%
2) 38.2%
3) 53.2%
4) 68.2%

160 Solve algebraically for x: $\dfrac{1}{x+3} - \dfrac{2}{3-x} = \dfrac{4}{x^2-9}$

161 Which values of x are in the solution set of the following system of equations?

$$y = 3x - 6$$

$$y = x^2 - x - 6$$

1) $0, -4$
2) $0, 4$
3) $6, -2$
4) $-6, 2$

162 The solution set of the equation $\sqrt{x+3} = 3 - x$ is

1) $\{1\}$
2) $\{0\}$
3) $\{1,6\}$
4) $\{2,3\}$

163 If $f(x) = 4x - x^2$ and $g(x) = \dfrac{1}{x}$, then $(f \circ g)\left(\dfrac{1}{2}\right)$ is equal to

1) $\dfrac{4}{7}$
2) -2
3) $\dfrac{7}{2}$
4) 4

164 In $\triangle ABC$, $m\angle A = 120$, $b = 10$, and $c = 18$. What is the area of $\triangle ABC$ to the *nearest square inch*?

1) 52
2) 78
3) 90
4) 156

165 Three marbles are to be drawn at random, without replacement, from a bag containing 15 red marbles, 10 blue marbles, and 5 white marbles. Which expression can be used to calculate the probability of drawing 2 red marbles and 1 white marble from the bag?

1) $\dfrac{_{15}C_2 \cdot {_5}C_1}{_{30}C_3}$

2) $\dfrac{_{15}P_2 \cdot {_5}P_1}{_{30}C_3}$

3) $\dfrac{_{15}C_2 \cdot {_5}C_1}{_{30}P_3}$

4) $\dfrac{_{15}P_2 \cdot {_5}P_1}{_{30}P_3}$

166 The probability that the Stormville Sluggers will win a baseball game is $\dfrac{2}{3}$. Determine the probability, to the *nearest thousandth*, that the Stormville Sluggers will win *at least* 6 of their next 8 games.

167 Which graph represents the solution set of $|6x - 7| \le 5$?

1)

2)

3)

4)

26
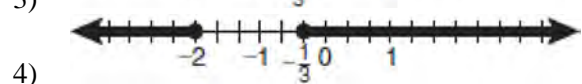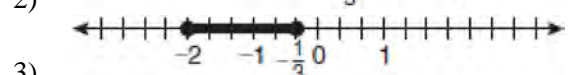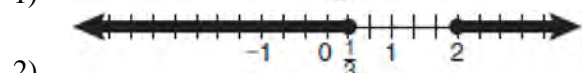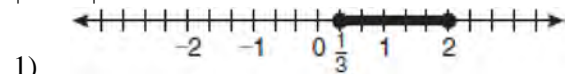
168 Which equation is represented by the graph below?

1) $y = 5^x$

2) $y = 0.5^x$

3) $y = 5^{-x}$

4) $y = 0.5^{-x}$

169 The expression $2i^2 + 3i^3$ is equivalent to
1) $-2 - 3i$
2) $2 - 3i$
3) $-2 + 3i$
4) $2 + 3i$

170 The equation $x^2 + y^2 - 2x + 6y + 3 = 0$ is equivalent to
1) $(x - 1)^2 + (y + 3)^2 = -3$
2) $(x - 1)^2 + (y + 3)^2 = 7$
3) $(x + 1)^2 + (y + 3)^2 = 7$
4) $(x + 1)^2 + (y + 3)^2 = 10$

171 Which values of x are solutions of the equation $x^3 + x^2 - 2x = 0$?
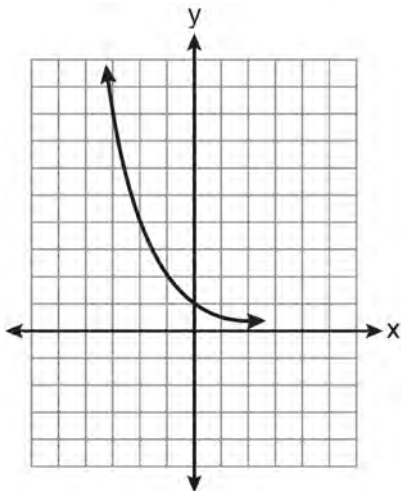1) $0, 1, 2$
2) $0, 1, -2$
3) $0, -1, 2$
4) $0, -1, -2$

172 Akeem invests $25,000 in an account that pays 4.75% annual interest compounded continuously. Using the formula $A = Pe^{rt}$, where A = the amount in the account after t years, P = principal invested, and r = the annual interest rate, how many years, to the *nearest tenth*, will it take for Akeem's investment to triple?
1) 10.0
2) 14.6
3) 23.1
4) 24.0

173 Express in simplest form: $\dfrac{\dfrac{1}{2} - \dfrac{4}{d}}{\dfrac{1}{d} + \dfrac{3}{2d}}$

174 Graph the inequality $-3|6 - x| < -15$ for x. Graph the solution on the line below.

27

175 What is the domain of the function

$f(x) = \sqrt{x-2} + 3$?

1) $(-\infty, \infty)$
2) $(2, \infty)$
3) $[2, \infty)$
4) $[3, \infty)$

176 If $\log_4 x = 2.5$ and $\log_y 125 = -\dfrac{3}{2}$, find the numerical

value of $\dfrac{x}{y}$, in simplest form.

177 The expression $\dfrac{\sin^2 \theta + \cos^2 \theta}{1 - \sin^2 \theta}$ is equivalent to

1) $\cos^2 \theta$
2) $\sin^2 \theta$
3) $\sec^2 \theta$
4) $\csc^2 \theta$

178 What is the solution set of the equation
$|4a + 6| - 4a = -10$?

1) $\varnothing$
2) $\{0\}$
3) $\left\{\dfrac{1}{2}\right\}$
4) $\left\{0, \dfrac{1}{2}\right\}$

179 Which graph represents one complete cycle of the equation $y = \sin 3\pi x$?
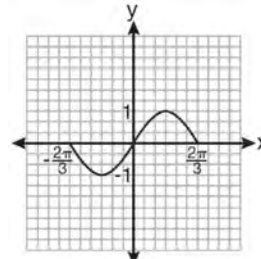
1)
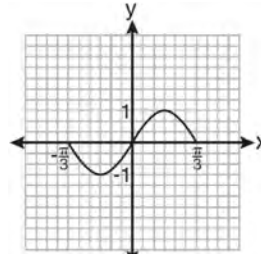
2)
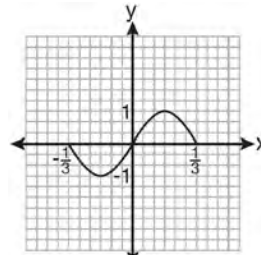
3)
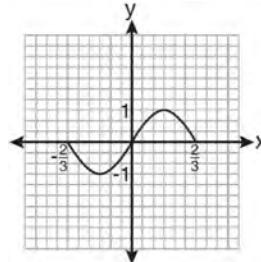
4)

180 Two forces of 25 newtons and 85 newtons acting on a body form an angle of 55°. Find the magnitude of the resultant force, to the *nearest hundredth of a newton*. Find the measure, to the *nearest degree*, of the angle formed between the resultant and the larger force.

181 In a study of 82 video game players, the researchers found that the ages of these players were normally distributed, with a mean age of 17 years and a standard deviation of 3 years. Determine if there were 15 video game players in this study over the age of 20. Justify your answer.

182 In the diagram below of right triangle KTW, $KW = 6$, $KT = 5$, and $m\angle KTW = 90$.
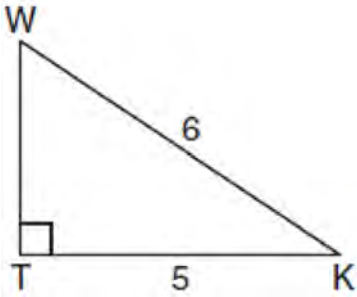

What is the measure of $\angle K$, to the *nearest minute*?
1) 33°33'
2) 33°34'
3) 33°55'
4) 33°56'

183 If $f(x) = \frac{1}{2}x - 3$ and $g(x) = 2x + 5$, what is the value of $(g \circ f)(4)$?
1) −13
2) 3.5
3) 3
4) 6

184 When simplified, the expression $\left(\dfrac{w^{-5}}{w^{-9}}\right)^{\frac{1}{2}}$ is equivalent to
1) w^{-7}
2) w^2
3) w^7
4) w^{14}

185 Four points on the graph of the function f(x) are shown below.
$$\{(0,1),(1,2),(2,4),(3,8)\}$$
Which equation represents f(x)?
1) $f(x) = 2^x$
2) $f(x) = 2x$
3) $f(x) = x + 1$
4) $f(x) = \log_2 x$

186 The probability that a professional baseball player will get a hit is $\frac{1}{3}$. Calculate the exact probability that he will get *at least* 3 hits in 5 attempts.

187 If $\sin A = \frac{2}{3}$ where $0° < A < 90°$, what is the value of $\sin 2A$?
1) $\dfrac{2\sqrt{5}}{3}$
2) $\dfrac{2\sqrt{5}}{9}$
3) $\dfrac{4\sqrt{5}}{9}$
4) $-\dfrac{4\sqrt{5}}{9}$

188 Which calculator output shows the strongest linear relationship between x and y?

1)
Lin Reg
$y = a + bx$
$a = 59.026$
$b = 6.767$
$r = .8643$

2)
Lin Reg
$y = a + bx$
$a = .7$
$b = 24.2$
$r = .8361$

3)
Lin Reg
$y = a + bx$
$a = 2.45$
$b = .95$
$r = .6022$

4)
Lin Reg
$y = a + bx$
$a = -2.9$
$b = 24.1$
$r = -.8924$

189 If $f(x) = x^2 - 5$ and $g(x) = 6x$, then $g(f(x))$ is equal to
1) $6x^3 - 30x$
2) $6x^2 - 30$
3) $36x^2 - 5$
4) $x^2 + 6x - 5$

190 Ms. Bell's mathematics class consists of 4 sophomores, 10 juniors, and 5 seniors. How many different ways can Ms. Bell create a four-member committee of juniors if each junior has an equal chance of being selected?
1) 210
2) 3,876
3) 5,040
4) 93,024

191 What is the sum of the first 19 terms of the sequence $3, 10, 17, 24, 31, \ldots$?
1) 1188
2) 1197
3) 1254
4) 1292

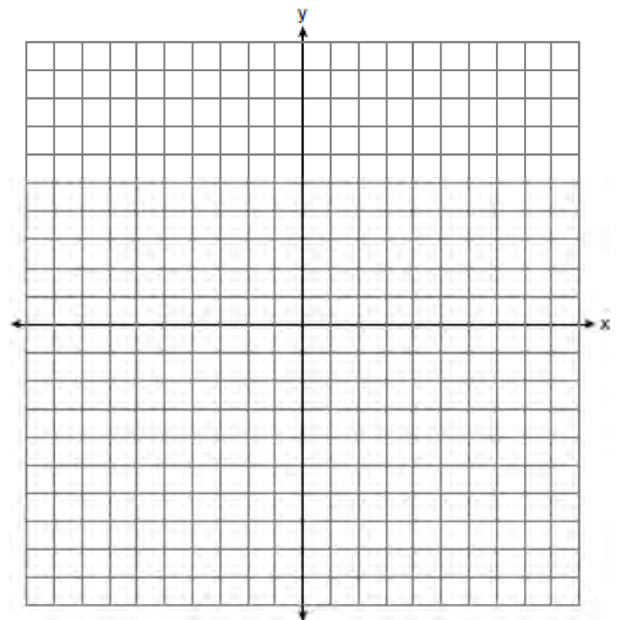192 Which relation is *not* a function?
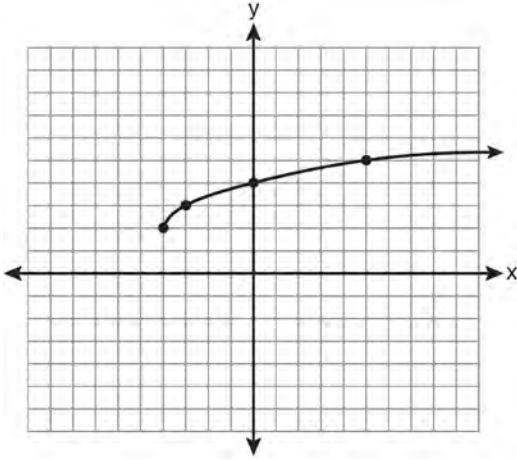1) $(x - 2)^2 + y^2 = 4$
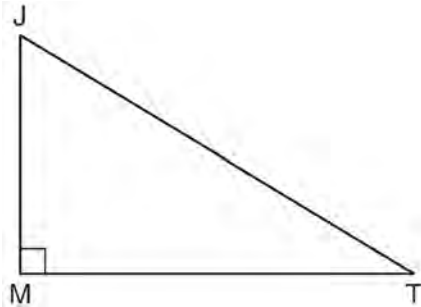2) $x^2 + 4x + y = 4$
3) $x + y = 4$
4) $xy = 4$

193 The graph of the equation $y = \left(\dfrac{1}{2}\right)^x$ has an asymptote. On the grid below, sketch the graph of $y = \left(\dfrac{1}{2}\right)^x$ and write the equation of this asymptote.

30

194 What are the domain and the range of the function shown in the graph below?

1) $\{x \mid x > -4\}; \{y \mid y > 2\}$
2) $\{x \mid x \geq -4\}; \{y \mid y \geq 2\}$
3) $\{x \mid x > 2\}; \{y \mid y > -4\}$
4) $\{x \mid x \geq 2\}; \{y \mid y \geq -4\}$

195 In the diagram below of right triangle JTM, $JT = 12$, $JM = 6$, and m$\angle JMT = 90$.

What is the value of $\cot J$?

1) $\dfrac{\sqrt{3}}{3}$
2) 2
3) $\sqrt{3}$
4) $\dfrac{2\sqrt{3}}{3}$

196 Which function is one-to-one?
1) $f(x) = |x|$
2) $f(x) = 2^x$
3) $f(x) = x^2$
4) $f(x) = \sin x$

197 Perform the indicated operations and simplify completely:
$$\frac{x^3 - 3x^2 + 6x - 18}{x^2 - 4x} \cdot \frac{2x - 4}{x^4 - 3x^3} \div \frac{x^2 + 2x - 8}{16 - x^2}$$

198 The expression $\log_5\left(\dfrac{1}{25}\right)$ is equivalent to

1) $\dfrac{1}{2}$
2) 2
3) $-\dfrac{1}{2}$
4) -2

199 If $r = \sqrt[3]{\dfrac{A^2 B}{C}}$, then $\log r$ can be represented by

1) $\dfrac{1}{6}\log A + \dfrac{1}{3}\log B - \log C$
2) $3(\log A^2 + \log B - \log C)$
3) $\dfrac{1}{3}\log(A^2 + B) - C$
4) $\dfrac{2}{3}\log A + \dfrac{1}{3}\log B - \dfrac{1}{3}\log C$

200 The expression $\cos 4x \cos 3x + \sin 4x \sin 3x$ is equivalent to
1) $\sin x$
2) $\sin 7x$
3) $\cos x$
4) $\cos 7x$

201 Express in simplest form: $\sqrt[3]{\dfrac{a^6 b^9}{-64}}$

202 In a triangle, two sides that measure 6 cm and 10 cm form an angle that measures 80°. Find, to the *nearest degree*, the measure of the smallest angle in the triangle.

203 If $f(x) = x^2 - 6$ and $g(x) = 2^x - 1$, determine the value of $(g \circ f)(-3)$.

204 Given angle A in Quadrant I with $\sin A = \dfrac{12}{13}$ and angle B in Quadrant II with $\cos B = -\dfrac{3}{5}$, what is the value of $\cos(A - B)$?
1) $\dfrac{33}{65}$
2) $-\dfrac{33}{65}$
3) $\dfrac{63}{65}$
4) $-\dfrac{63}{65}$

205 When $\dfrac{3}{2}x^2 - \dfrac{1}{4}x - 4$ is subtracted from $\dfrac{5}{2}x^2 - \dfrac{3}{4}x + 1$, the difference is
1) $-x^2 + \dfrac{1}{2}x - 5$
2) $x^2 - \dfrac{1}{2}x + 5$
3) $-x^2 - x - 3$
4) $x^2 - x - 3$

206 Solve the equation $8x^3 + 4x^2 - 18x - 9 = 0$ algebraically for all values of x.

207 The expression $\sqrt[4]{16x^2 y^7}$ is equivalent to
1) $2x^{\frac{1}{2}} y^{\frac{7}{4}}$
2) $2x^8 y^{28}$
3) $4x^{\frac{1}{2}} y^{\frac{7}{4}}$
4) $4x^8 y^{28}$

208 When $x^{-1} + 1$ is divided by $x + 1$, the quotient equals
1) 1
2) $\dfrac{1}{x}$
3) x
4) $-\dfrac{1}{x}$

209 Mrs. Hill asked her students to express the sum $1+3+5+7+9+...+39$ using sigma notation. Four different student answers were given. Which student answer is correct?

1) $\sum_{k=1}^{20}(2k-1)$

2) $\sum_{k=2}^{40}(k-1)$

3) $\sum_{k=-1}^{37}(k+2)$

4) $\sum_{k=1}^{39}(2k-1)$

210 The expression $\log_8 64$ is equivalent to
1) 8
2) 2
3) $\dfrac{1}{2}$
4) $\dfrac{1}{8}$

211 Which value of r represents data with a strong negative linear correlation between two variables?
1) -1.07
2) -0.89
3) -0.14
4) 0.92

212 Assume that the ages of first-year college students are normally distributed with a mean of 19 years and standard deviation of 1 year. To the *nearest integer*, find the percentage of first-year college students who are between the ages of 18 years and 20 years, inclusive. To the *nearest integer*, find the percentage of first-year college students who are 20 years old or older.

213 The scores of one class on the Unit 2 mathematics test are shown in the table below.

Unit 2 Mathematics Test

Test Score	Frequency
96	1
92	2
84	5
80	3
76	6
72	3
68	2

Find the population standard deviation of these scores, to the *nearest tenth*.

214 Solve for x: $\dfrac{4x}{x-3}=2+\dfrac{12}{x-3}$

215 Which statement about the graph of the equation $y=e^x$ is *not* true?
1) It is asymptotic to the x-axis.
2) The domain is the set of all real numbers.
3) It lies in Quadrants I and II.
4) It passes through the point $(e,1)$.

216 If $\angle A$ is acute and $\tan A = \dfrac{2}{3}$, then

1) $\cot A = \dfrac{2}{3}$

2) $\cot A = \dfrac{1}{3}$

3) $\cot(90° - A) = \dfrac{2}{3}$

4) $\cot(90° - A) = \dfrac{1}{3}$

217 The product of $(3 + \sqrt{5})$ and $(3 - \sqrt{5})$ is

1) $4 - 6\sqrt{5}$

2) $14 - 6\sqrt{5}$

3) 14

4) 4

218 The value of the expression $2\displaystyle\sum_{n=0}^{2}(n^2 + 2^n)$ is

1) 12

2) 22

3) 24

4) 26

219 What is the fourth term in the expansion of $(3x - 2)^5$?

1) $-720x^2$

2) $-240x$

3) $720x^2$

4) $1,080x^3$

220 A population of rabbits doubles every 60 days according to the formula $P = 10(2)^{\frac{t}{60}}$, where P is the population of rabbits on day t. What is the value of t when the population is 320?

1) 240

2) 300

3) 660

4) 960

221 Factor completely: $10ax^2 - 23ax - 5a$

222 The lengths of 100 pipes have a normal distribution with a mean of 102.4 inches and a standard deviation of 0.2 inch. If one of the pipes measures exactly 102.1 inches, its length lies

1) below the 16th percentile

2) between the 50th and 84th percentiles

3) between the 16th and 50th percentiles

4) above the 84th percentile

223 Express the product of $\left(\dfrac{1}{2}y^2 - \dfrac{1}{3}y\right)$ and $\left(12y + \dfrac{3}{5}\right)$ as a trinomial.

224 In simplest form, $\sqrt{-300}$ is equivalent to

1) $3i\sqrt{10}$

2) $5i\sqrt{12}$

3) $10i\sqrt{3}$

4) $12i\sqrt{5}$

225 What is the number of degrees in an angle whose measure is 2 radians?

1) $\dfrac{360}{\pi}$

2) $\dfrac{\pi}{360}$

3) 360

4) 90

226 Matt places $1,200 in an investment account earning an annual rate of 6.5%, compounded continuously. Using the formula $V = Pe^{rt}$, where V is the value of the account in t years, P is the principal initially invested, e is the base of a natural logarithm, and r is the rate of interest, determine the amount of money, to the *nearest cent*, that Matt will have in the account after 10 years.

227 What are the values of θ in the interval $0° \le \theta < 360°$ that satisfy the equation $\tan\theta - \sqrt{3} = 0$?

1) 60°, 240°

2) 72°, 252°

3) 72°, 108°, 252°, 288°

4) 60°, 120°, 240°, 300°

228 Express as a single fraction the exact value of $\sin 75°$.

229 A blood bank needs twenty people to help with a blood drive. Twenty-five people have volunteered. Find how many different groups of twenty can be formed from the twenty-five volunteers.

230 If $\tan A = \dfrac{2}{3}$ and $\sin B = \dfrac{5}{\sqrt{41}}$ and angles A and B are in Quadrant I, find the value of $\tan(A+B)$.

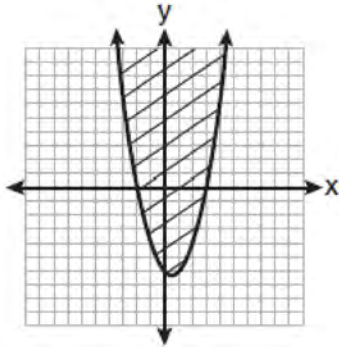231 The graph below represents the function $y = f(x)$.
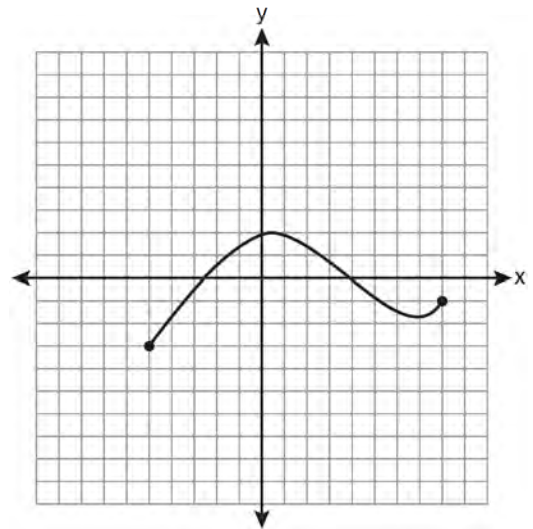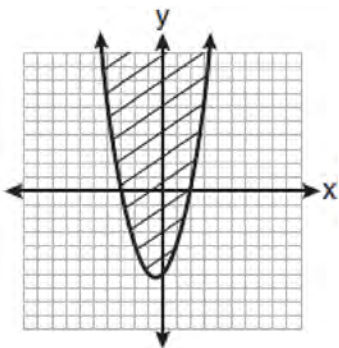

State the domain and range of this function.

232 Express the exact value of $\csc 60°$, with a rational denominator.

233 The members of a men's club have a choice of wearing black or red vests to their club meetings. A study done over a period of many years determined that the percentage of black vests worn is 60%. If there are 10 men at a club meeting on a given night, what is the probability, to the *nearest thousandth*, that *at least* 8 of the vests worn will be black?
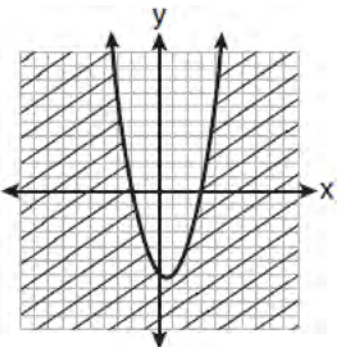
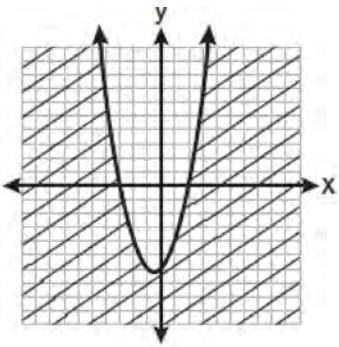234 Which graph best represents the inequality
$y + 6 \geq x^2 - x$?

1)

2)

3)

4)