

JEFFERSON MATH PROJECT REGENTS AT RANDOM

The NY Algebra 2/Trigonometry Regents Exams
Fall 2009-August 2010

www.jmap.org

Dear Sir

I have to acknowledge the receipt 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 indispensable 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

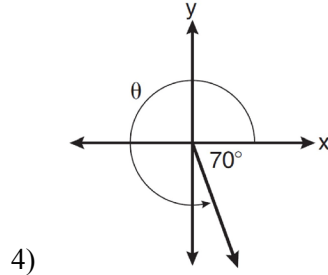
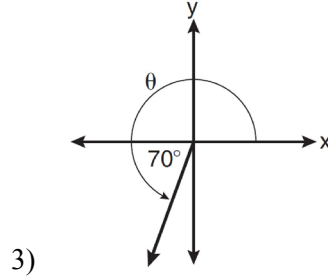
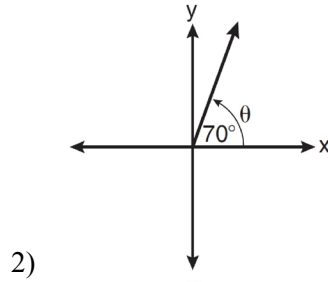
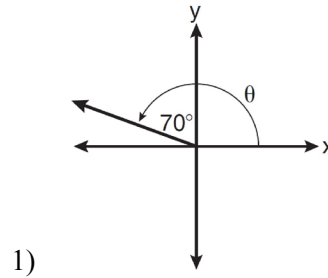
- 1 Find the total number of different twelve-letter arrangements that can be formed using the letters in the word *PENNSYLVANIA*.
- 2 The expression $4ab\sqrt{2b} - 3a\sqrt{18b^3} + 7ab\sqrt{6b}$ is equivalent to
 - 1) $2ab\sqrt{6b}$
 - 2) $16ab\sqrt{2b}$
 - 3) $-5ab + 7ab\sqrt{6b}$
 - 4) $-5ab\sqrt{2b} + 7ab\sqrt{6b}$
- 3 Express the sum $7 + 14 + 21 + 28 + \dots + 105$ using sigma notation.
- 4 The fraction $\frac{3}{\sqrt{3a^2b}}$ is equivalent to
 - 1) $\frac{1}{a\sqrt{b}}$
 - 2) $\frac{\sqrt{b}}{ab}$
 - 3) $\frac{\sqrt{3b}}{ab}$
 - 4) $\frac{\sqrt{3}}{a}$
- 5 The solution set of $4^{x^2+4x} = 2^{-6}$ is
 - 1) $\{1, 3\}$
 - 2) $\{-1, 3\}$
 - 3) $\{-1, -3\}$
 - 4) $\{1, -3\}$
- 6 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
- 7 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
- 8 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
- 9 The expression $(3 - 7i)^2$ is equivalent to
 - 1) $-40 + 0i$
 - 2) $-40 - 42i$
 - 3) $58 + 0i$
 - 4) $58 - 42i$

10 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.

11 For which equation does the sum of the roots equal $\frac{3}{4}$ 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) $4x^2 + 3x - 2 = 0$

12 In which graph is θ coterminal with an angle of -70° ?



13 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) $-6, 2$

14 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

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

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

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

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

- 1) {1}
- 2) {0}
- 3) {1,6}
- 4) {2,3}

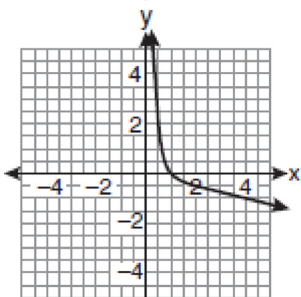
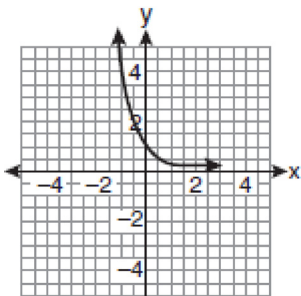
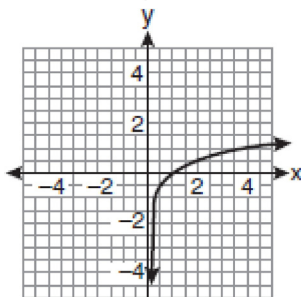
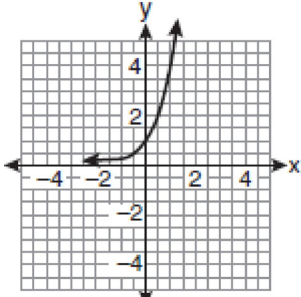
19 If $f(x) = \frac{1}{2}x - 3$ and $g(x) = 2x + 5$, what is the value of $(g \circ f)(4)$?

- 1) -13
- 2) 3.5
- 3) 3
- 4) 6

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

- 1) $\cot A = \frac{2}{3}$
- 2) $\cot A = \frac{1}{3}$
- 3) $\cot(90^\circ - A) = \frac{2}{3}$
- 4) $\cot(90^\circ - A) = \frac{1}{3}$

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



22 Solve for x : $\frac{4x}{x-3} = 2 + \frac{12}{x-3}$

- 23 The value of the expression $2 \sum_{n=0}^2 (n^2 + 2^n)$ is
- 1) 12
 - 2) 22
 - 3) 24
 - 4) 26

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

- 25 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*.

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

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

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

29 What is a formula for the n th term of sequence B shown below?

$$B = 10, 12, 14, 16, \dots$$

1) $b_n = 8 + 2n$

2) $b_n = 10 + 2n$

3) $b_n = 10(2)^n$

4) $b_n = 10(2)^{n-1}$

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

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

2) -3

3) 3

4) 9

31 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.

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

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

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

3) $\frac{4}{3}$

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

33 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

34 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*.

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

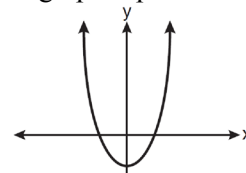
36 Find all values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation $\sin 2\theta = \sin \theta$.

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

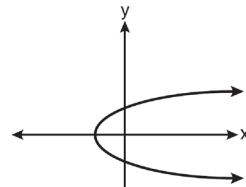
38 The solutions of the equation $y^2 - 3y = 9$ are

- 1) $\frac{3 \pm 3i\sqrt{3}}{2}$
- 2) $\frac{3 \pm 3i\sqrt{5}}{2}$
- 3) $\frac{-3 \pm 3\sqrt{5}}{2}$
- 4) $\frac{3 \pm 3\sqrt{5}}{2}$

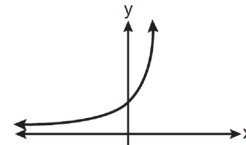
39 Which graph represents a one-to-one function?



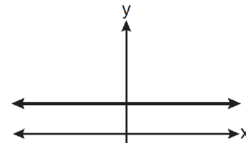
1)



2)



3)

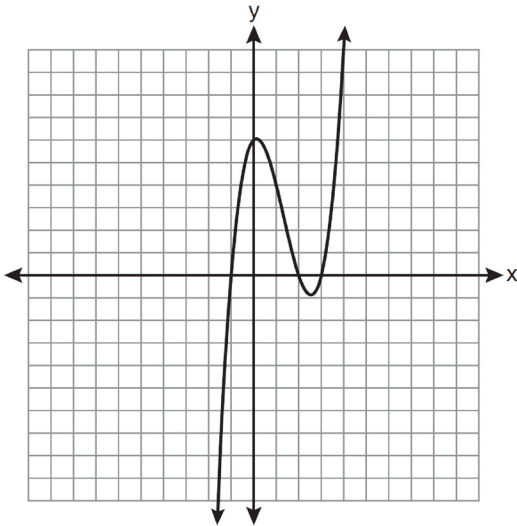


4)

40 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) $-\cos^2 \theta - 1$

41 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

42 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.

43 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

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

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 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

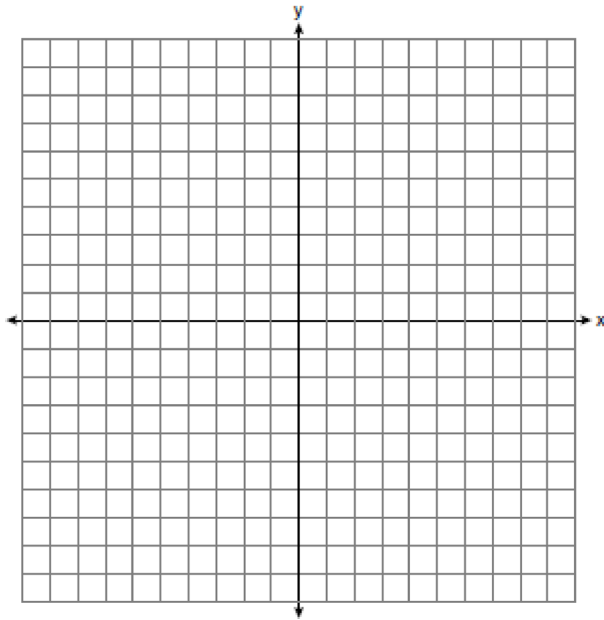
47 Find, to the nearest minute, the angle whose measure is 3.45 radians.

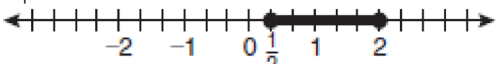
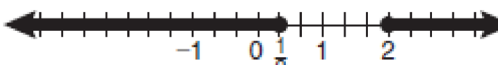
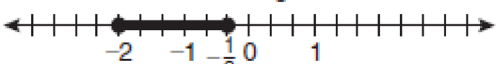
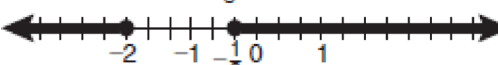
48 If θ is an angle in standard position and its terminal side passes through the point $(-3, 2)$, find the exact value of $\csc \theta$.

49 What is the conjugate of $-2 + 3i$?

- 1) $-3 + 2i$
- 2) $-2 - 3i$
- 3) $2 - 3i$
- 4) $3 + 2i$

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



- 51 Which graph represents the solution set of $|6x - 7| \leq 5$?
- 1) 
- 2) 
- 3) 
- 4) 
- 52 Use the discriminant to determine all value of k that would result in the equation $x^2 - kx + 4 = 0$ having equal roots.

- 53 Solve the equation $2 \tan C - 3 = 3 \tan C - 4$ algebraically for all values of C in the interval $0^\circ \leq C < 360^\circ$.
- 54 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.
- 55 What is the solution of the equation $2 \log_4(5x) = 3$?
- 1) 6.4
2) 2.56
3) $\frac{9}{5}$
4) $\frac{8}{5}$
- 56 The product of i^7 and i^5 is equivalent to
- 1) 1
2) -1
3) i
4) $-i$
- 57 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?
- 58 What is the fourth term in the expansion of $(3x - 2)^5$?
- 1) $-720x^2$
2) $-240x$
3) $720x^2$
4) $1,080x^3$

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

- 1) $\frac{a^6}{b^5}$
- 2) $\frac{b^5}{a^6}$
- 3) $\frac{a^2}{b}$
- 4) $a^{-2}b^{-1}$

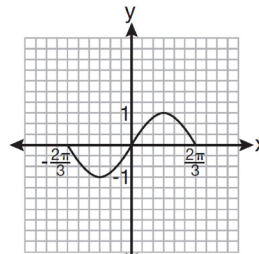
60 Mrs. Hill asked her students to express the sum $1 + 3 + 5 + 7 + 9 + \dots + 39$ using sigma notation. Four different student answers were given. Which student answer is correct?

- 1) $\sum_{k=1}^{20} (2k - 1)$
- 2) $\sum_{k=2}^{40} (k - 1)$
- 3) $\sum_{k=-1}^{37} (k + 2)$
- 4) $\sum_{k=1}^{39} (2k - 1)$

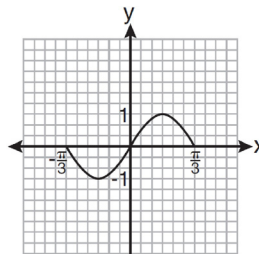
61 The roots of the equation $2x^2 + 7x - 3 = 0$ are

- 1) $-\frac{1}{2}$ and -3
- 2) $\frac{1}{2}$ and 3
- 3) $\frac{-7 \pm \sqrt{73}}{4}$
- 4) $\frac{7 \pm \sqrt{73}}{4}$

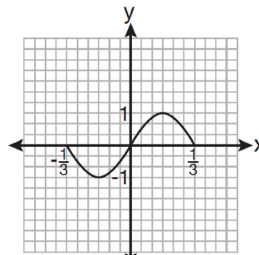
62 Which graph represents one complete cycle of the equation $y = \sin 3\pi x$?



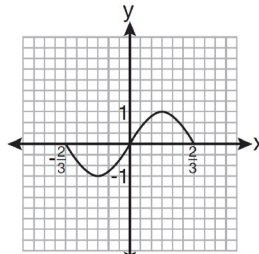
1)



2)



3)



4)

63 What is the radian measure of an angle whose measure is -420° ?

- 1) $-\frac{7\pi}{3}$
- 2) $-\frac{7\pi}{6}$
- 3) $\frac{7\pi}{6}$
- 4) $\frac{7\pi}{3}$

- 64 What are the values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation $\tan \theta - \sqrt{3} = 0$?
- 1) $60^\circ, 240^\circ$
 - 2) $72^\circ, 252^\circ$
 - 3) $72^\circ, 108^\circ, 252^\circ, 288^\circ$
 - 4) $60^\circ, 120^\circ, 240^\circ, 300^\circ$
- 65 Express $\frac{5}{3-\sqrt{2}}$ with a rational denominator, in simplest radical form.
- 66 The table below shows the first-quarter averages for Mr. Harper's statistics class.

Statistics Class Averages

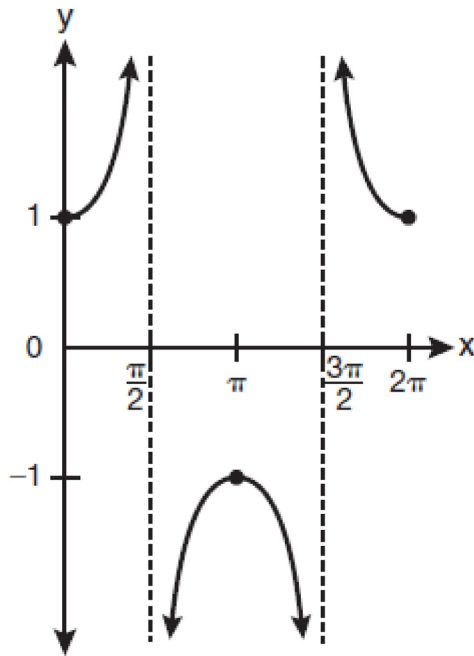
| Quarter Averages | Frequency |
|------------------|-----------|
| 99 | 1 |
| 97 | 5 |
| 95 | 4 |
| 92 | 4 |
| 90 | 7 |
| 87 | 2 |
| 84 | 6 |
| 81 | 2 |
| 75 | 1 |
| 70 | 2 |
| 65 | 1 |

What is the population variance for this set of data?

- 1) 8.2
- 2) 8.3
- 3) 67.3
- 4) 69.3

- 67 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) $\{x \mid 0 \leq x \leq \pi\}$
 - 2) $\{x \mid 0 \leq x \leq 2\pi\}$
 - 3) $\left\{x \mid -\frac{\pi}{2} < x < \frac{\pi}{2}\right\}$
 - 4) $\left\{x \mid -\frac{\pi}{2} < x < \frac{3\pi}{2}\right\}$
- 68 In simplest form, $\sqrt{-300}$ is equivalent to
- 1) $3i\sqrt{10}$
 - 2) $5i\sqrt{12}$
 - 3) $10i\sqrt{3}$
 - 4) $12i\sqrt{5}$
- 69 If $\tan A = \frac{2}{3}$ and $\sin B = \frac{5}{\sqrt{41}}$ and angles A and B are in Quadrant I, find the value of $\tan(A+B)$.
- 70 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

71 Which equation is represented by the graph below?



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

72 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) $-x(x+3)(x-2)$

73 What is the domain of the function

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

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

74 The expression $\cos 4x \cos 3x + \sin 4x \sin 3x$ is equivalent to

- 1) $\sin x$
- 2) $\sin 7x$
- 3) $\cos x$
- 4) $\cos 7x$

75 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) $\frac{8!}{4!}$
- 3) $\frac{8!}{2!+2!}$
- 4) $\frac{8!}{2! \cdot 2!}$

76 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

77 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

78 Which expression is equivalent to $\frac{\sqrt{3}+5}{\sqrt{3}-5}$?

- 1) $\frac{14+5\sqrt{3}}{11}$
- 2) $\frac{17+5\sqrt{3}}{11}$
- 3) $\frac{14+5\sqrt{3}}{14}$
- 4) $\frac{17+5\sqrt{3}}{14}$

79 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) $(-6, -3)$

80 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 $g(x) = -\frac{1}{2}x + 4$

81 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) $f(x) = \log_2 x$

82 What is the period of the function

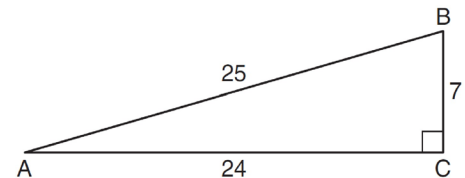
$$y = \frac{1}{2} \sin\left(\frac{x}{3} - \pi\right)?$$

- 1) $\frac{1}{2}$
- 2) $\frac{1}{3}$
- 3) $\frac{2}{3}\pi$
- 4) 6π

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

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

84 Which ratio represents $\csc A$ in the diagram below?



- 1) $\frac{25}{24}$
- 2) $\frac{25}{7}$
- 3) $\frac{24}{7}$
- 4) $\frac{7}{24}$

85 The expression $\log_8 64$ is equivalent to

- 1) 8
- 2) 2
- 3) $\frac{1}{2}$
- 4) $\frac{1}{8}$

86 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

87 What is the value of x in the equation

$$9^{3x+1} = 27^{x+2}?$$

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

88 If $a = 3$ and $b = -2$, what is the value of the

expression $\frac{a^{-2}}{b^{-3}}$?

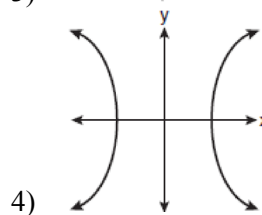
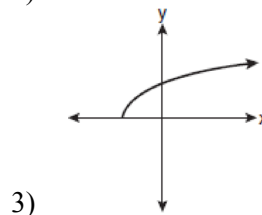
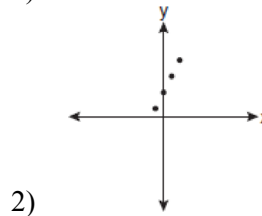
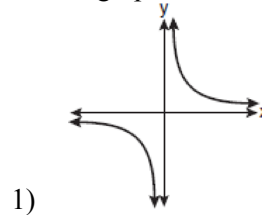
- 1) $-\frac{9}{8}$
- 2) -1
- 3) $-\frac{8}{9}$
- 4) $\frac{8}{9}$

89 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.

90 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) $f(\theta) = 2\sin \theta + 3$

91 Which graph does *not* represent a function?



92 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) $\{(0, 1), (1, 0), (2, 0), (3, 2)\}$

93 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.

94 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) $\frac{20!}{3!}$
- 3) ${}_{20}C_3$
- 4) ${}_{20}P_3$

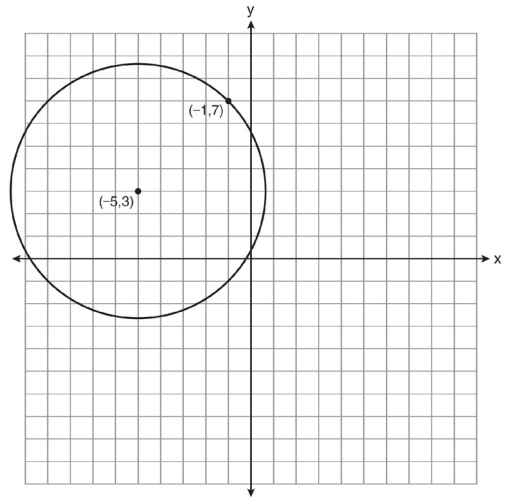
95 In a triangle, two sides that measure 6 cm and 10 cm form an angle that measures 80° . Find, to the *nearest degree*, the measure of the smallest angle in the triangle.

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

equivalent to

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

97 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.

98 When $x^{-1} - 1$ is divided by $x - 1$, the quotient is

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

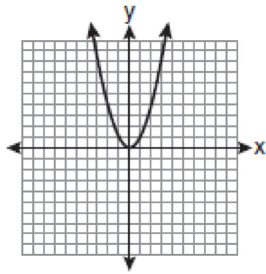
99 What is the principal value of $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$?

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

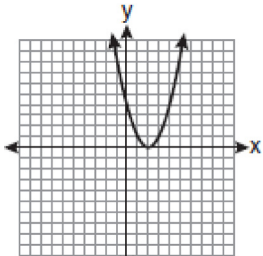
100 The expression $2i^2 + 3i^3$ is equivalent to

- 1) $-2 - 3i$
- 2) $2 - 3i$
- 3) $-2 + 3i$
- 4) $2 + 3i$

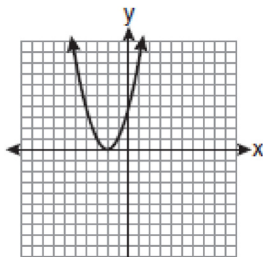
101 The graph below shows the function $f(x)$.



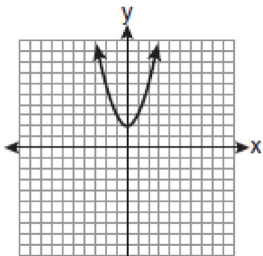
Which graph represents the function $f(x+2)$?



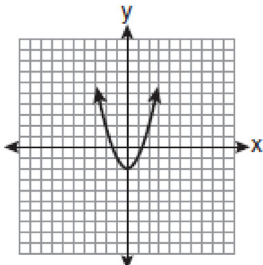
1)



2)

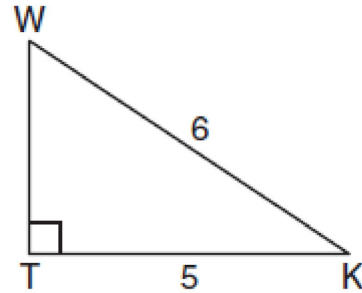


3)



4)

102 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) $33^\circ 33'$
- 2) $33^\circ 34'$
- 3) $33^\circ 55'$
- 4) $33^\circ 56'$

103 Find the first four terms of the recursive sequence defined below.

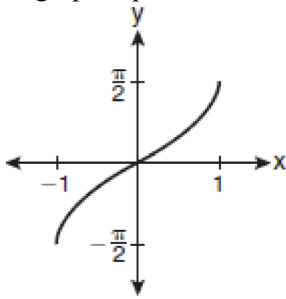
$$a_1 = -3$$

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

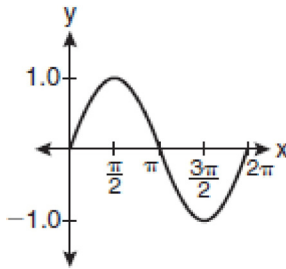
104 Factored completely, the expression $12x^4 + 10x^3 - 12x^2$ is equivalent to

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

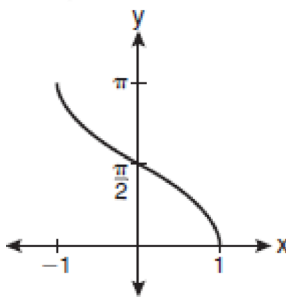
105 Which graph represents the equation $y = \cos^{-1}x$?



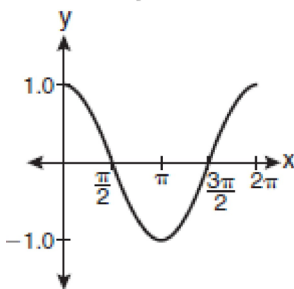
1)



2)



3)



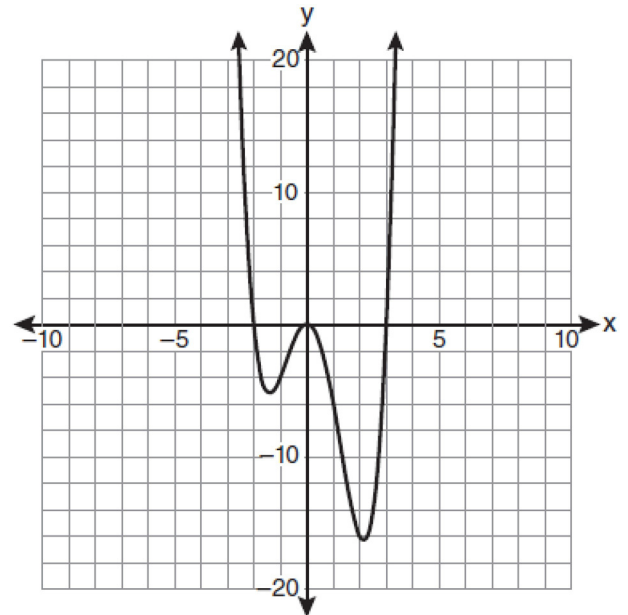
4)

106 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) $(x + 1)^2 + (y + 3)^2 = 10$

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

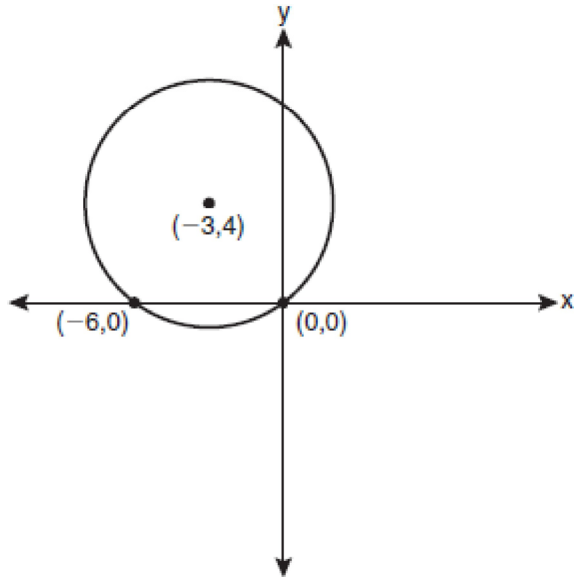
108 The graph of $y = f(x)$ is shown below.



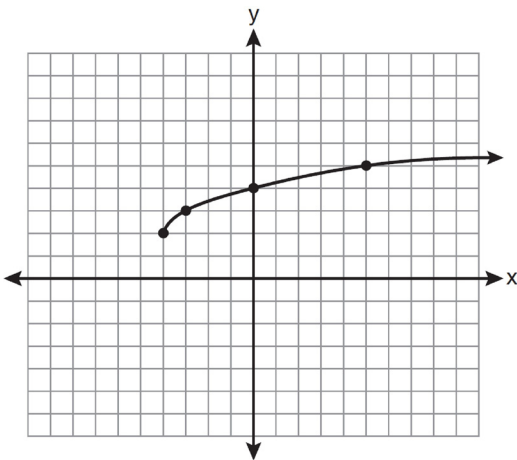
Which set lists all the real solutions of $f(x) = 0$?

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

- 109 Write an equation of the circle shown in the graph below.



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



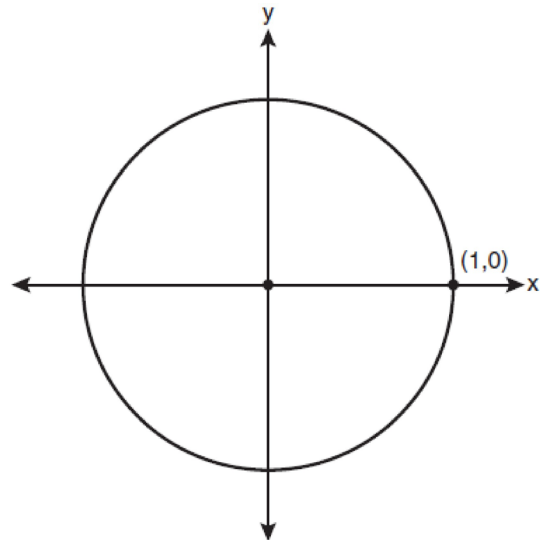
- 1) $\{x|x > -4\}; \{y|y > 2\}$
- 2) $\{x|x \geq -4\}; \{y|y \geq 2\}$
- 3) $\{x|x > 2\}; \{y|y > -4\}$
- 4) $\{x|x \geq 2\}; \{y|y \geq -4\}$

- 111 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.

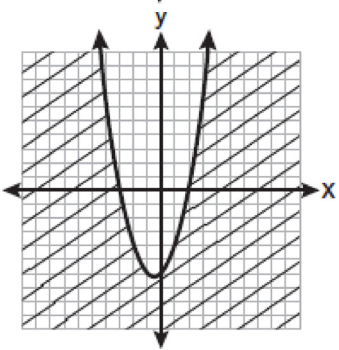
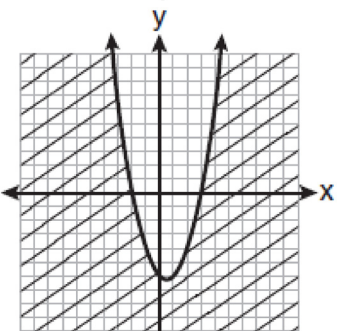
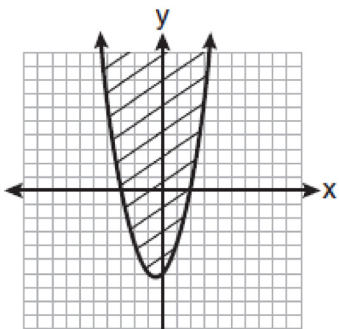
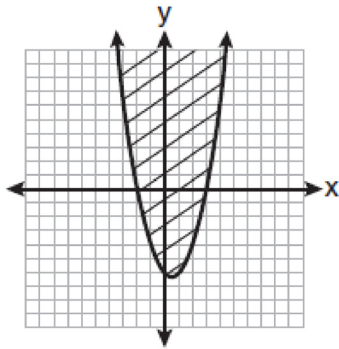
- 112 The expression $2 \log x - (3 \log y + \log z)$ is equivalent to

- 1) $\log \frac{x^2}{y^3 z}$
- 2) $\log \frac{x^2 z}{y^3}$
- 3) $\log \frac{2x}{3yz}$
- 4) $\log \frac{2xz}{3y}$

- 113 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 $\sin 240^\circ$.



- 114 Which graph best represents the inequality $y + 6 \geq x^2 - x$?



- 115 What is the formula for the n th term of the sequence 54, 18, 6, ...?

- 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) $a_n = 54\left(\frac{1}{3}\right)^{n-1}$

- 116 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.

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