1. $[3,7) \cup \{ (-8,4] \cap (-2,5) \} =$
   A. $(-2,5)$ B. $[3,5)$ C. $[3,4]$ D. $(-2,7)$ E. none of these

2. How many of the following could not be the sine of an acute angle?
   $$\frac{\sqrt{11}}{5}, \quad e-2, \quad \frac{\pi}{4}, \quad \frac{1-\sqrt{2}}{7}$$
   A. 0   B. 1   C. 2   D. 3   E. 4

3. The sum of the squares of three consecutive positive integers is 21,170. What is the sum of the cubes of those three consecutive positive integers?
   A. 332,064   B. 1,778,616   C. 2,985,984   D. 3,080,217   E. 16,003,008

4. An airplane flies a roundtrip distance of L miles each way. The average speed on the outward leg is 160 miles per hour; the average speed on the return leg is 240 miles per hour. Find the average speed for the entire trip.
   A. 192 mph   B. 196 mph   C. 200 mph   D. 204 mph   E. 208 mph

5. Find the reflection (or mirror image) of the point (-3,0) about the line $y = 3x - 1$.
   A. $(3,0)$ B. $(3,-3)$ C. $(3,-\sqrt{2})$ D. $(3,-1)$ E. $(3,-2)$

6. An equilateral triangle is inscribed in a circle. What percentage of the area of the circle is covered by the triangle? Round to the nearest whole percent.
   A. 59%   B. 53%   C. 44%   D. 41%   E. 38%

7. Lines L_1 and L_2 each pass through (3,4), but the slope of L_1 is one more than the slope of L_2. L_2 crosses the y-axis k units above the point where L_1 crosses the y-axis. Find k.
   A. 1   B. 2   C. 3   D. 4   E. There is not enough information given to determine k.

8. How many positive numbers are there such that $x^{(x^x)} = (x^x)^x$?
   A. 1   B. 2   C. 3   D. more than 3, but finitely many   E. infinitely many

9. What is the remainder when 3^{3333} is divided by 5?
   A. 0   B. 1   C. 2   D. 3   E. 4

10. How many of the following intervals are subsets of the domain of $f(x) = \dfrac{\sqrt{3x^2 - 7x - 6}}{x - 4}$?
    $$(-\infty,-1), \quad (-7,0), \quad [\pi,4), \quad [3,10), \quad (8,+\infty)$$
    A. 1   B. 2   C. 3   D. 4   E. 5

11. If θ is an acute angle with $\sin 3\theta = \cos 2\theta$, find $\sin 5\theta$.
    A. $\dfrac{\sqrt{5}-1}{4}$ B. $\dfrac{\sqrt{2}}{2}$ C. $\dfrac{\sqrt{3}}{2}$ D. 1   E. none of these

12. A square has sides of 10 inches each. A second square is inscribed in the original square by connecting the midpoints of the sides. A third square is then formed by connecting the midpoints of the sides of the second square. This process is continued endlessly. What is the sum of the areas of the infinite sequence of squares?
    A. 150 sq in   B. 200 sq in   C. $150 + 50\sqrt{2}$ sq in   D. 300 sq in   E. The sum is infinite.

13. How many of the following equations have infinitely many solutions?
    I. $\cot^2 x = (\cot x)^2$ II. $(\sin x)^{-1} = \csc x$ III. $\cos^{-1} x = \sec x$
    IV. $\sin^{-1} x = (\sin x)^{-1}$ V. $\tan^{-1} x = \cot x$
    A. 1   B. 2   C. 3   D. 4   E. 5

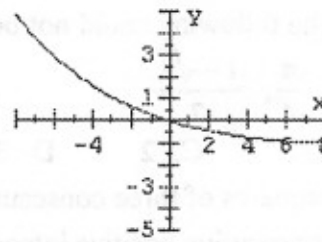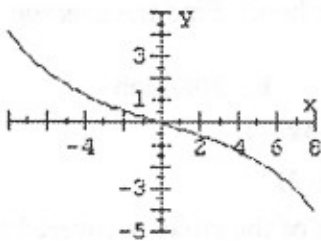14. Which of the following is the best graph of $2^{x+y} = 3^{x+2y}$?
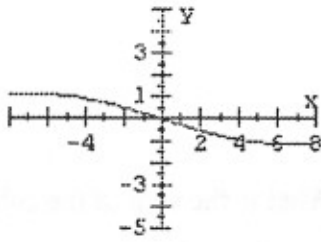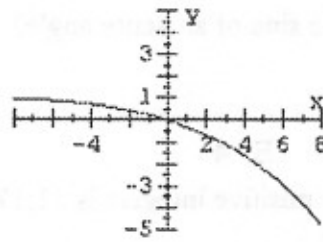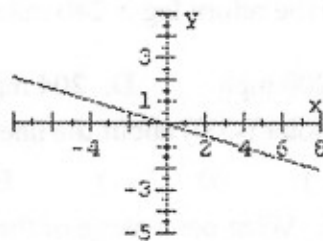
    A.   B.   C.

    D.   E.

15. Let $y_1 = f(x) = \dfrac{x+1}{x-1}$; $y_2 = f(y_1)$; $y_3 = f(y_2)$; $y_{n+1} = f(y_n)$ for $n = 1, 2, 3, 4, \ldots$.

    Find y_{100}.

    A. x B. $\dfrac{x+1}{x-1}$ C. $\dfrac{x+100}{x-100}$ D. $\dfrac{100x+1}{100x-1}$ E. none of these

16. Ten writers covering a basketball league vote for the Most Valuable Player of the league by listing their top three choices. A first place vote earns five points, a second place vote earns three points, and a third place vote earns one point. Julie Jubilee received 37 points. How many writers listed her on their ballots?

    A. 7   B. 8   C. 9   D. 10   E. There is not enough information to determine this.

17. A circle is inscribed inside the parabola $y = x^2$ with points of tangency at $x = \pm 1$. The slope of the line tangent to both the parabola and the circle at the point $(1,1)$ is 2. Find the y-coordinate of the point of the circle nearest the x-axis.

    A. $\dfrac{3-\sqrt{5}}{2}$ B. $\dfrac{2}{5}$ C. $\dfrac{\sqrt{3}}{4}$ D. $\dfrac{\sqrt{5}}{5}$ E. none of these

18. A chord in a unit circle cuts off a region of area one. What is the measure to the nearest degree of the central angle which subtends the chord?

    A. $135°$ B. $139°$ C. $142°$ D. $146°$ E. $150°$

19. Let $f(x) = a\sqrt{x} + \dfrac{b}{\sqrt{x}}$, where $a, b, x > 0$. Find the range of f.

    A. $[a+b, +\infty)$ B. $[2ab, +\infty)$ C. $\left[\sqrt{a} + \sqrt{b}, +\infty\right)$ D. $[a^2 + b^2, +\infty)$

    E. $\left[2\sqrt{ab}, +\infty\right)$

20. After wearing a pair of socks a dozen times, what is the probability to the nearest hundredth that each sock has been on each foot exactly a half dozen times?

    A. 0.23   B. 0.25   C. 0.27   D. 0.37   E. 0.50