1.   The numerical values of the x- and y-intercepts of a straight line are the same nonzero number. What is the slope of the line?

A.   -2   B.   -1   C.   0   D.   1   E.   2

2.   A fraction is chosen at random from all positive unreduced proper fractions with denominators less than 6. Find the probability that the fraction's decimal representation terminates.

A.   3/5   B.   2/3   C.   7/10   D.   7/9   E.   4/5

3.   Two adjacent faces of a rectangular box have areas 36 and 63. If all three dimensions are positive integers, find the ratio of the largest possible volume of the box to the smallest possible volume.

A.   1   B.   2   C.   3   D.   9   E.   12

4.   Five students enroll in a statistics class. The first test is scored on a percent basis (0% to 100%) rounding each score to the nearest whole number. Four of their scores are 93, 96, 99, and 100. How many possible whole number scores on the fifth student's test will make the median of the five scores equal to the mean of the five scores?

A. 0   B. 1   C. 2   D. 3   E. more than 3

5.   In the expression (AM)(AT)(YC), each different letter is replaced by a different digit 0 to 9 to form three two-digit numbers. If the product is to be as large as possible, what are the last two digits of the product?

A.   20   B.   40   C.   50   D.   60   E.   90

6.   A basketball player has a constant probability of 80% of making a free throw. Find the probability that her next successful free throw is the third or fourth one she attempts.

A.   0.032   B.   0.0384   C.   0.048   D. 0.096   E.   0.192

7.   If $\begin{bmatrix} a & b \\ c & d \end{bmatrix} \cdot \begin{bmatrix} 5 & -10 \\ -3 & 6 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, find the smallest possible value of $a + b + c + d$, if a, b, c, and d are all positive integers.

A.   4   B.   8   C.   12   D.   16   E.   24

8.   Sue works weekdays for $10 an hour, Saturdays for $15 an hour, and Sundays for $20 an hour. If she worked 180 hours last month and earned $2315, how many more weekday hours than Sunday hours did she work last month?

A.   75   B.   77   C.   80   D. 82   E.   85

9.   Let $s(x) = \sin(\pi x)$ and $S(x) = [s(x)]^2$. Find $s(s(1/6)) + S(S(1/3))$.

A. 3/4   B. 1   C. 4/3   D. 3/2   E. 2

10.   The year 2006 is the product of exactly three distinct primes p, q, and r. How many other years are also the product of three distinct primes with sum equal to $p + q + r$?

A.   2   B.   3   C.   4   D.   5   E.   6

11. How many positive integers less than 1000 are relatively prime to 105? Two integers are relatively prime if their greatest common divisor is 1.

A. 325 B. 457 C. 466 D. 533 E. 674

12. In isosceles $\triangle ABE$ with base AB, AB = 10 and BE = 13. Square ABCD intersects $\triangle ABE$ at points F and G. Find the area common to the interiors of the square and the triangle.

A. 125/3 B. 35 C. 40 D. 175/3 E. 65

13. The equation $x^{\log_{25} 9} + 9^{\log_{25} x} = 54$ has a solution in common with which of the following?

A. $x^3 - 125x^2 - x + 125 = 0$ B. $x^3 + 5x^2 - 25x - 125 = 0$
C. $x^3 - 5x^2 - 25x + 125 = 0$ D. $5x^3 + 5x^2 - 125x - 125 = 0$
E. $5x^3 - 5x^2 - 125x + 125 = 0$

14. If you have eight pairs of socks, each pair a different color, find the probability that if you randomly lose five socks, the remaining socks form exactly four matching pairs (and three unmatched socks).

A. 20/39 B. 7/13 C. 22/39 D. 23/39 E. 8/13

15. If $h(x) = 2x + 2$ and $k(x) = 2x^3 - 7x^2 - 11x + 6$, find the sum of all of the irrational zeros of $h(k(x))$ and $k(h(x))$.

A. 1/2 B. 3/2 C. 7/2 D. 9/2 E. 11/2

16. If $h(x) = 2x + 2$ and $k(x) = 2x^3 - 7x^2 - 11x + 6$, find the sum of all of the rational zeros of $h(k(x))$ and $k(h(x))$.

A. -5/4 B. -3/4 C. -1/4 D. 1/4 E. 3/4

17. In pentagon AMTYC, AC = MT = 10, YT = CY = 20, $\angle A = \angle M = 135°$, and $\angle Y = 150°$. Find the area of the pentagon to the nearest square unit.

A. 315 B. 318 C. 320 D. 323 E. 325

18. How many 4-digit numbers whose digits are all odd are multiples of 11?

A. 80 B. 85 C. 90 D. 95 E. 100

19. Find the tens digit of 3^{2007}.

A. 0 B. 2 C. 4 D. 6 E. 8

20. In the sequence $a_1, a_2, a_3, \ldots, a_1 = 1, a_2 = 2, a_3 = 5$, and for all $n \geq 3$, $a_{n-1}a_{n-2} = 2a_na_{n-2} - 2a_{n-1}a_{n-1}$. Find a_{2006}/a_{2005}.

A. 1002 B. 1002.5 C. 1003 D. 1003.5 E. 1004