1. A line passes through the point $(-3, -2)$. What is the greatest slope it could have if it never enters the second quadrant (the axes do not belong to any quadrant)

   A. $\frac{3}{2}$ B. $-\frac{3}{2}$ C. $\frac{2}{3}$ D. $-\frac{2}{3}$ E. 0

2. If $i = \sqrt{-1}$, then $4(1+i)^{-1}$ is

   A. $2+2i$ B. $2-2i$ C. $4+4i$ D. $4-4i$ E. undefined

3. The area of the traingle with vertices $(1-2)$, $(9,2)$ an $(5,5)$ is

   A. 18 B. 20 C. 22 D. 24 E. 26

4. A banquet hall has capacity 400 persons (includeing both diners and servers). If one server is needed for every 12 diners, the maximum number of diners is

   A. 366 B. 367 C. 368 D. 369 E. 370

5. The letters A, M, A, T, Y, C are listed so that the letters are in increasing order of the number of distinct line segments or curves used the draw them. The identical letters are not adjacent. The fourth letter of the list is

   A. A B. C C. M D. T E. Y

6. The sum of all solutions of the equation $|2x-1| = 7$ is

   A. 4 B. 3 C. 2 D. 1 E. 0

7. Two runners running around a 600 m track in opposite directions and starting from the same place run a lap in 100 sec and 150 sec respectively. How many meters from their starting place are the runners when they meet fro the eighth time (not counting the start)?

   A. 60 B. 120 C. 180 D. 240 E. 300

8. Electrical resistance in a wire is directly proportional to its length and inversely proportional to the square of its diameter. If a 10 cm long wire with diameter 2 cm has resistance 600 ohms, a 15 cm long wire with diameter 5 cm has resistance

   A. 3750 ohms B. 2500 ohms C. 1000 ohms D. 360 ohms E. 144 ohms

9. If $\cot C = 2$, then $\sin 2C =$

   A. $\frac{3}{\sqrt{10}}$ B. $\frac{1}{\sqrt{5}}$ C. $\frac{2}{\sqrt{5}}$ D. $\frac{4}{5}$ E. $\frac{9}{10}$

10. An ice cream parlor sells cones with at most 3 scoops, each scoop a different flavor chosen from vanilla, chocolate or strawberry. If a customer randomly selects of the the parlor's possible kinds of cones (order of flavors doesn't matter), the probability that the cone includes a scoop of chocolate is

    A. $\frac{1}{3}$ B. $\frac{3}{8}$ C. $\frac{3}{7}$ D. $\frac{1}{2}$ E. $\frac{4}{7}$

11. $\triangle$ABC is a right triangle with hypotenuse $\overline{\text{AC}}$, AB = 8, and BC = 6. Point D is chosen on $\overline{\text{BC}}$ so that BD = 5, and ray BA is extended to point E so that BE = 12. If F is the intersection of $\overline{\text{AC}}$ and $\overline{\text{DE}}$, the distance DF equals

A. $\frac{13}{4}$ B. $\frac{15}{4}$ C. 4 D. $\frac{25}{4}$ E. $\frac{39}{4}$

12. To the nearest tenth, the sum of the unreal solutions of the equation $x^3 + 3x^2 - 5 = 0$ is

A. -4.1 B. -3.0 C. 0.0 D. 1.9 E. 3.9

13. How many solutions in the interval $-2\pi \le t \le 2\pi$ does the equation $\cos 2t = \sin t + \cos t$ have?

A. 4 B. 5 C. 7 D. 9 E. 10

14. The following best describes the set of real values of r for which there exists a real value of s such that $\log r + \log s = \log(r + s)$?

A. all r B. all $r > 0$ C. all r between 0 and 1 D. all $r > 1$ E. no r

15. Rectangle R_1 has vertices $(\pm 5, \pm 4)$, and rectangle R_2 has vertices $(\pm 3, \pm 2)$. The probability to the nearest hundredth that a point chosen at random from the interior of R_1 is no more than 1 unit from some point of R_2 is

A. 0.40 B. 0.45 C. 0.49 D. 0.50 E. 0.59

16. An object moves along the number line from 0 to 10 by moving either 1 or 2 units each time it moves. How many different sequences of moves are possible?

A. 9 B. 10 C. 32 D. 55 E. 89

17. If (x, y) is any point in the solution set of the system $\begin{cases} 2x + 3y \le 42 \\ 3x + 2y \ge 24 \\ 2x - y \ge 2 \\ x - 2y \le 0 \end{cases}$

the smallest possible value of $2x + y$ is

A. 12 B. 14 C. 15 D. 22 E. 30

18. Two vehicles leave an intersection at the same time, one headed northwest at 30 mph, the other headed east at 40 mph. To the nearest 1 mph, how fast are they moving apart? (note: due to a misprint, the answer is not one of the choices below)

A. 41 mph B. 50 mph C. 55 mph D. 58 mph E. 70 mph

19. Which of the numbers 2, 3, or 4 is a factor of $5^{2000} - 1$?

A. 2 only B. 3 only C. 2 and 4 only D. 2 and 3 only E. 2, 3, and 4

20. In a collection of 2000 positive integers, the sum of the mean μ, median M, and (unique) mode m is 5. Which of the following is possible? (note: more than one of the choices below are possible)

A. $M = m = 2$ B. $\mu = M = 1$ C. $\mu = M = 2$ D. $M = m = 1$ E. $\mu = m = 1$

1. C
2. B
3. B
4. D
5. E
6. D
7. B
8. E
9. D
10. E
11. A
12. A
13. D
14. D
15. C
16. E
17. B
18. Correct for all students
19. E
20. C or D