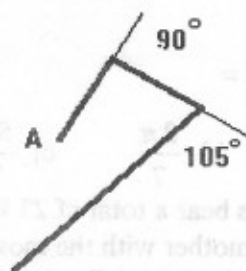


- How many positive divisors does 12^8 have?
 - 128
 - 130
 - 132
 - 153
 - 155
- What is the 1994th decimal digit in the decimal expansion of $\frac{3}{14}$?
 - 1
 - 2
 - 4
 - 7
 - 8
- The asymptotes of the graph of $xy + y = (x - 2)^2$ are
 - $x = 0$ and $y = 0$
 - $x = -1$ and $y = 5 - x$
 - $x = -1, y = 0$, and $y = x - 5$
 - $x = -1$ and $y = 0$
 - $x = -1$ and $y = x - 5$
- $\cos^{-1}\left(\cos\frac{37\pi}{7}\right) =$
 - $-\frac{2\pi}{7}$
 - $\frac{2\pi}{7}$
 - $\frac{5\pi}{7}$
 - $\frac{9\pi}{7}$
 - $\frac{37\pi}{7}$
- Four mother cats bear a total of 23 kittens. No two mothers have the same number of kittens, and the mother with the most kittens has exactly twice as many as the mother with the fewest. Which of the following is not the number of kittens for any of the four mothers?
 - 4
 - 5
 - 6
 - 7
 - 8
- Which of the following circles does not intersect the graph of $y = \sin x$?
 - $x^2 + y^2 = 100$
 - $x^2 + 100x + y^2 = 100$
 - $x^2 + y^2 = 100y$
 - $x^2 + 3x + y^2 - 3y + 3 = 0$
 - $x^2 - 12x + y^2 - 2y + 25 = 0$
- The number of solutions of $\log_2 x + \log_2(x^2 + 2x - 1) = 1$ is
 - 0
 - 1
 - 2
 - 3
 - 4
- If one-fifth of two-fifths more than x is three-fifths less than four-fifths of x then two-fifths of x is
 - $\frac{17}{15}$
 - $\frac{2}{25}$
 - $\frac{13}{25}$
 - $\frac{34}{75}$
 - $\frac{26}{125}$
- How many solutions does $|x| + |x + 1| = |2x + 5|$ have?
 - 0
 - 1
 - 2
 - 4
 - 8
- How many counting numbers less than 1000 have exactly three positive divisors?
 - 11
 - 14
 - 16
 - 23
 - none of these
- The sum of the squares of all solutions for $x^2 = \sqrt{5x^2 - 4}$ is
 - 1
 - 2
 - 5
 - 6
 - 10
- $\overline{AB} = 10$ and $m\angle A = 30^\circ$. Let $M, N,$ and P be the number of possible triangles $\triangle ABC$ formed if $\overline{BC} = 4, 6,$ and 12 respectively. Then $M + 2N + 3P =$
 - 5
 - 6
 - 7
 - 9
 - 10

13. The number of solutions for $\sin\left(\frac{10}{x^2+1}\right) = 0$ is
 a) 2 b) 3 c) 4 d) 6 e) infinitely many
14. In which quadrant(s) is(are) the foci of $9x^2 - 16y^2 - 36x - 64y + 116 = 0$ located?
 a) I b) II c) I and II d) II and III e) I and IV
15. $\left(\frac{1+i}{\sqrt{2}}\right)^{20} =$
 a) -1 b) 1 c) 2^{-10} d) -2^{-10} e) $\frac{1-i}{2^{10}}$

16. Mariah starts at point A and walks in a straight line for 800 ft, then makes a 90° turn to the right and walks for 800 ft more in a straight line. She then makes a sharp right turn of 105° and continues walking in a straight line for an extended time. What is the closest will she come to point A while walking along this third leg of her journey?



- a) 400 ft b) $200\sqrt{2}$ ft c) $400\sqrt{2}$ ft d) $400\sqrt{6}$ ft
 e) none of these are correct
17. The eight corners of a cube are labeled with the integers 1 through 8, with each corner having a different label. The cube is rolled and resulting value of the roll is defined to be the sum of the four integers on corners not in contact with the tabletop. The expected value (or mathematical expectation) for a roll is
 a) 14 b) 16 c) 18 d) 20 e) cannot be determined from the information given.

Write the answers for Problems 18 - 20 on the answer sheet. Remember, there is no penalty for wrong answers on questions which are not multiple choice.

18. In a yard with children and dogs, there are ninety percent more legs than eyes and seven more heads than tails. How many dogs are in the yard?
19. How many positive integers have base four representations with five digits and base five representations with four digits?
20. In a certain town every street is long, straight, and runs either east-west or north-south. Zung starts at one intersection and heads north. Whenever he comes to any intersection, he rolls a die and turns left if he rolls a one or two, continues straight if he rolls a three or four, and turns right if he rolls a five or six. What is the probability that he will be back at the starting point as he prepares to make his sixth roll? (Write your answer as a fraction in reduced form.)