College of Charleston
Math Meet 2025
Written Test – Level 1

1. What is the remainder when $18!$ is divided by 19?
   (A) 1 (B) 4 (C) 13
   (D) 18 (E) None of these

2. A number X is randomly selected from the interval $(0, 3)$. What is the probability that $X^2 - 5X + 6 > 0$?
   (A) 1/3 (B) 1/2 (C) 2/3 (D) 3/4 (E) 1/4

3. What is the area of the largest rectangle that can be inscribed in a circle of diameter d?
   (A) $\frac{1}{4}d^2$ (B) $\frac{1}{2}d^2$ (C) d^2
   (D) πd (E) none of these

4. Find the coefficient of x^{50} in the polynomial
   $$(1 + x^2 + x^4 + x^6 + \cdots + x^{100})(1 + x^4 + x^8 + x^{12} + \cdots + x^{100}).$$
   (A) 13 (B) 14 (C) 15 (D) 17 (E) 18

5. A dish contains twenty wrapped chocolate candies. Eight of them are *dark* chocolate and twelve are *milk* chocolate. Ten of them have *yellow* wrappers and ten have *blue* wrappers. Only two of the candies with yellow wrappers are dark.
   I have randomly selected a candy from the dish and notice that it has a blue wrapper. What is the probability that it is *dark* chocolate?
   (A) $.2$ (B) $.5$ (C) $.6$ (D) $.75$ (E) $.8$

6. A line segment has endpoints $(0, 0)$ and $(12, a)$. There are exactly four points (possibly including the endpoints) on the line segment which have integer coordinates. Which of the following could be the slope of the line segment?
   (A) $-\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$
   (D) $\frac{1}{8}$ (E) none of these

7. If you throw a dart at square $ABCD$, and it lands at point P, what is the probability that $\angle APB$ is acute? Round your answer to the nearest percentage.
   (A) 22% (B) 39% (C) 50% (D) 61% (E) 90%

8. A professor distributes 20 sample mathematics problems and says that the test will consist of 10 problems chosen from these 20. What is the minimum number of these sample problems that a student must know how to do in order to guarantee that they will pass the test with at least a grade of 60%?
   (A) twenty questions (B) eighteen questions (C) sixteen questions
   (D) fourteen questions (E) none of the above

9. If the length of a rectangle is increased by 30 percent while its width is decreased by 20 percent, what happens to its area?

   (A) It increases by 4 percent.

   (B) It increases by 5 percent.

   (C) It increases by 6 percent.

   (D) It increases by 10 percent.

   (E) You cannot say unless you know the exact dimensions.

10. A spinner has an equal probability of landing on each of seven spaces, labeled with the numbers one through seven. You are going to be playing a game in which you will spin it 70 times, each time betting in advance on whether it will land on an even or an odd number. Which strategy should you adopt in order to win the most times?

    (A) There is no optimal strategy because it is random.

    (B) Bet *odd* exactly 40 times and *even* exactly 30 times.

    (C) Bet *odd* 35 times and *even* 35 times.

    (D) Bet *even* only if the previous spin landed on an *odd* number.

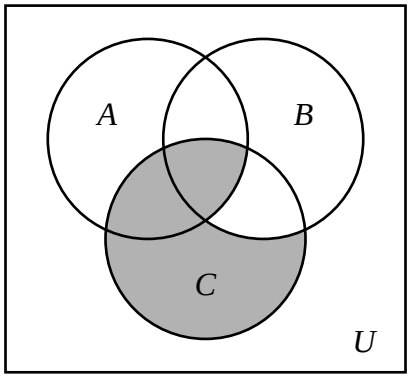
    (E) Bet on *odd* every time.

11. A billboard is 3 meters longer than it is high. The area of the billboard is 40 square meters. What is the perimeter?

    (A) 5 meters (B) 13 meters (C) 26 meters (D) 18 meters (E) 29 meters

12. If A, B, and C are subsets of the set U, then
    - $A \cap B$ is the set of all elements that belong to both A **and** B,
    - $A \cup B$ is the set of all elements that belong to A **or** B (or both), and
    - A^c is the set of all elements of U that are **not** in A.

    In the diagram, A, B and C are represented by circles and U is represented by a square.
    Which of the following expressions describes the region shaded in the diagram?



    (A) $(A \cup B^c) \cap C$ (B) $(A \cup B) \cup C^c$ (C) $(A^c \cap B^c) \cup C$

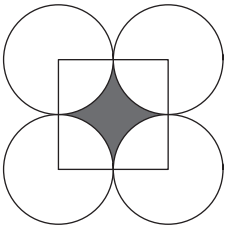
    (D) $(A \cap B) \cap C$ (E) $(A^c \cup B) \cup C^c$

13. What is the probability of getting a sum of sixteen in tossing three standard dice?

    (A) $1/6$ (B) $1/27$ (C) $1/36$

    (D) $1/12$ (E) None of the above

14. In the figure, each circle has radius of 4. Each corner of the square is the center of a circle. The circles are tangent to each other as shown. The area of the shaded region is closest to



    (A) 3.4 (B) 13.7 (C) 48.0 (D) 50.2 (E) 114.2

15. Find the union of all intervals having the form $\left[1+\frac{1}{n}, 6-\frac{2}{n}\right]$ where n is a positive integer.

(A) $[1,6]$ (B) $(1,6)$ (C) $[2,4]$ (D) $[\frac{3}{2},5]$ (E) $(1,5)$

16. The coordinates of the point on the line $y=2x+1$ that is closest to the point $(4,2)$ are:

(A) $(8/5, 21/5)$ (B) $(6/5, 17/5)$ (C) $(-2/3, -1/3)$

(D) $(4/3, 11/3)$ (E) none of the above

17. Given the following four statements:

I. Exactly one of these statements is false.
II. Exactly two of these statements are false.
III. Exactly three of these statements are false.
IV. Exactly four of these statements are false

Assume that each statement is either true or false. Among them, the number of false statements is exactly

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

18. Identical squares are arranged in a grid 2 squares high by n squares wide. If 2 out of these $2n$ squares are chosen at random, let p be the probability that they form a rectangle. What is the smallest value of n for which $p < 1/3$?

(A) 3 (B) 4 (C) 5

(D) 6 (E) none of these

19. The numerator of a fraction is $a6bc$ and the denominator of this fraction is $de3fg$, where a, b, c, d, e, f, g, are unique digits. The numerator and the denominator consist of all of the digits 1,2,3,4,5,6,7,8, and 9. If the value of the fraction is one-half, what must be the value of digit e ?

(A) 5 (B) 7 (C) 8

(D) 9 (E) none of these

20. Let $f(x) = 2x^2 - 19x + 42$. For how many values of x are both x and $f(x)$ prime? (Note: 0, 1, and negative integers are *not* regarded as prime)

(A) none (B) one (C) two

(D) three (E) infinitely many

21. The polynomials $x^2 - 2x + a$ and $x^2 - 3x + b$ share a common root. What does that say about a and b?

(A) $a = b = 0$ (B) $2a = 3b$ (C) $b = 2a$

(D) $(a-b)^2 = 2b - 3a$ (E) none of these

22. A staircase has twelve steps. You can take one or two steps at a time. In how many different ways can you go up the staircase?

(A) 116 (B) 228 (C) 233

(D) 427 (E) none of these

23. Let S be the set of all numbers which are the sum of the squares of three consecutive integers. Then we can say that

(A) No member of S is divisible by 2

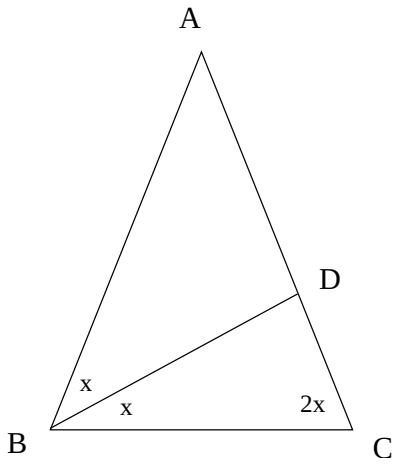
(B) No member of S is divisible by 3

(C) No member of S is divisible by 5

(D) No member of S is divisible by 7

(E) For any prime number N there is an element of S divisible by N

24. Isosceles triangle ABC has the property that, if D is a point on AC such that BD bisects base angle ABC, then triangles ABC and BCD are similar. If BC has length 1, then AB has length



(A) $\sqrt{2}$ (B) $\dfrac{1+\sqrt{5}}{2}$ (C) 1

(D) 2 (E) none of the above

25. A man and a woman have the same birthday. When he was as old as she is now, the man was twice as old as the woman. When she becomes as old as he is now, the sum of their ages will be 119. How old is the man now?

(A) 55 (B) 61 (C) 51

(D) 45 (E) None of the above.

2025 Answers / Level 1 Test

1. D
2. C
3. B
4. A
5. C
6. C
7. D
8. C
9. A
10. E
11. C
12. A
13. C
14. B
15. B
16. B
17. D
18. C
19. A
20. C
21. D
22. C
23. B
24. B
25. C