

Would you like to receive feedback from our execs? (marking your solutions, giving corrections, etc.)

Yes/No: _____

Multiple Choice

Highlight the correct answer for each question.

1. Find the difference between the largest and smallest real solutions to the equation

$$||x| - 1| - 1 = 0.$$

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

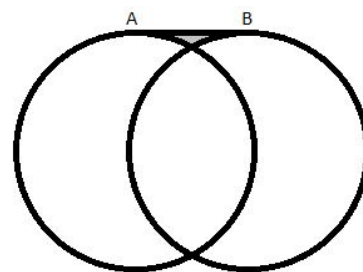
2. Mathlete is eating pizzas. If Mathlete eats $\frac{1}{2}$ of a pizza in each bite, there will be $\frac{1}{3}$ of a pizza left over. If Mathlete eats $\frac{1}{3}$ of a pizza in each bite, there will be $\frac{1}{6}$ of a pizza left over. Find the minimum number of pizzas.

- (A) $\frac{1}{6}$ (B) $\frac{5}{6}$ (C) 1 (D) $\frac{7}{6}$ (E) $\frac{11}{6}$

3. Mr. Beast is giving away lamborghinis. There are three rooms labeled A, B, C. Room A has 3 lamborghinis, room B has 1 lamborghini and 1 box of slime, and room C simply has 4 boxes of slime. You now pick a random room out of the three rooms, and pick a random object from the objects in that room. if you get a box of slime, what is the likelihood that you're in room B?

- (A) 0 (B) $\frac{1}{5}$ (C) $\frac{1}{3}$ (D) $\frac{1}{2}$ (E) 1

4. Brett Yang and Eddy Chen, after having made a pyramid out of triangular triangles, is now deciding to make a pyramid out of circular triangles (what?). The diagram on the right shows how they plan to connect two circles of radius 1 together. The two circles are in the same plane. The string attaching them, segment AB , is tangent to both circles and has length 1. The area of the shaded region is closest to which of the following?



- (A) 0.0430 (B) 0.0431 (C) 0.0432 (D) 0.0433 (E) 0.0434

5. Find the number of solution pairs (x, y) to the equation $x^2 + 2y^2 = 2xy$, where x and y are real.

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

Word Problems

Either type your solutions or insert images of handwritten solutions. Be sure to show your work!

1. Figs. 1 and 2 to the right made up of identical equilateral triangles. Is it possible to use the rhombus in Fig. 2 to completely cover all triangles in Fig. 1? No overlapping is allowed, and rhombuses are not allowed to stick outside the boundaries of Fig. 1.

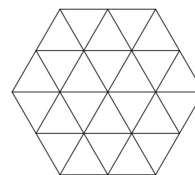


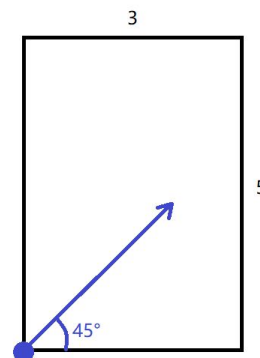
Fig. 1



Fig. 2

2. Dude Perfect is doing pool trick shots. The pool table has width 3 and length 5. Dude Perfect shoots a billiard ball from one corner of the table, in a direction 45° from an adjacent edge (see the figure to the right). After how many bounces will the ball enter a corner pocket?

Bonus: What if the width is m and the length is n , where m and n are positive integers?



3. If $x + \frac{1}{x} = 1$, find the value of $x^2 + \frac{1}{x^2}$.

Survey

Your responses will not affect your likelihood of being counted for attendance. This is simply to let us execs know how we can improve. :)

1. Approximately how much time did you spend on this problem set?

- (A) Less than 15 mins
- (B) 15 to 30 mins
- (C) 30 mins to 1 hour
- (D) 1 to 2 hours
- (E) Over 2 hours

2. How difficult did you find this problem set?

- (A) Too easy
- (B) Fairly easy
- (C) Neutral
- (D) Fairly difficult
- (E) Too difficult

Thank you for your feedback!