1 Season 2, Episode 1

Selected problems from 2016 AMC 10A

1. Three distinct integers are selected at random between 1 and 2016, inclusive. Which of the following is a correct statement about the probability p that the product of the three integers is odd?

   (A) $p < \frac{1}{8}$ **(B)** $p = \frac{1}{8}$ **(C)** $\frac{1}{8} < p < \frac{1}{3}$ **(D)** $p = \frac{1}{3}$ **(E)** $p > \frac{1}{3}$

2. Five friends sat in a movie theater in a row containing 5 seats, numbered 1 to 5 from left to right. (The directions "left" and "right" are from the point of view of the people as they sit in the seats.) During the movie Ada went to the lobby to get some popcorn. When she returned, she found that Bea had moved two seats to the right, Ceci had moved one seat to the left, and Dee and Edie had switched seats, leaving an end seat for Ada. In which seat had Ada been sitting before she got up?

   (A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 5

3. A triangle with vertices $A(0, 2)$, $B(-3, 2)$, and $C(-3, 0)$ is reflected about the x-axis, then the image $\triangle A'B'C'$ is rotated counterclockwise about the origin by 90° to produce $\triangle A''B''C''$. Which of the following transformations will return $\triangle A''B''C''$ to $\triangle ABC$?

   (A) counterclockwise rotation about the origin by 90°
   (B) clockwise rotation about the origin by 90°
   (C) reflection about the x-axis
   (D) reflection about the line $y = x$
   (E) reflection about the y-axis.

   (A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 5

4. Each vertex of a cube is to be labeled with an integer 1 through 8, with each integer being used once, in such a way that the sum of the four numbers on the vertices of a face is the same for each face. Arrangements that can be obtained from each other through rotations of the cube are considered to be the same. How many different arrangements are possible?

   (A) 1 **(B)** 3 **(C)** 6 **(D)** 12 **(E)** 24

5. In rectangle $ABCD$, $AB = 6$ and $BC = 3$. Point E between B and C, and point F between E and C are such that $BE = EF = FC$. Segments $\overline{AE}$ and $\overline{AF}$ intersect $\overline{BD}$ at P and Q, respectively. The ratio $BP : PQ : QD$ can be written as $r : s : t$, where the greatest common factor of r, s and t is 1. What is $r + s + t$?

   (A) 7 **(B)** 9 **(C)** 12 **(D)** 15 **(E)** 20

6. For some particular value of N, when $(a + b + c + d + 1)^N$ is expanded and like terms are combined, the resulting expression contains exactly 1001 terms that include all four variables a, b, c, and d, each to some positive power. What is N?

   (A) 9 **(B)** 14 **(C)** 16 **(D)** 17 **(E)** 19