Problems Set 28

1. Can you solve this system of equations to determine the value of v? w? x? y? z?
   Express the general solution of this system of equations in parametric form.

$$
\begin{align}
5v + w - x + 2y - 4z &= 2 \tag{1}\\
2v + 2w + x - y - 3x &= 15 \tag{2}\\
v + 3x - 3x + y + 2z &= 14 \tag{3}\\
3v - w - 2x - 2y - z &= 7 \tag{4}\\
v - 2w + 4x - 3y - 5z &= 0 \tag{5}
\end{align}
$$

2. One colleges admissions office tracks whether each applicant is male or female, in-state or out-of-state, undergraduate or graduate, and admitted or rejected. There are 800 in-state undergraduate applicants, and 700 female out-of-state applicants. 600 male applicants are admitted, and 500 graduate applicants are rejected. Among female graduate applicants, there are 200 more out-of-state applicants rejected than in-state-applicants admitted. Among male undergraduate applicants, there are 100 more in-state applicants admitted than out-of-state-applicants rejected. Determine the total number of applicants.

3. Determine a formula for computing the number of distinct paths from point X to point Y in the picture below, moving only toward the east along the segments. What kind of sequence does the formula represent?

4. Here C is the center of the circle and BCDF is a rectangle. The lengths of AF and EF are 6 and $\sqrt{2}$ respectively. Determine the length of each segment in this picture.
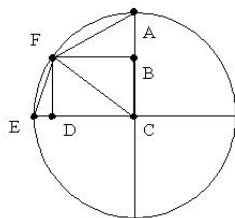
5. Ollie and Eliza play a game in which they alternate turns, with Ollie taking the first turn. Each player tosses two standard 6-sided dice on his/her turn. If the product of Ollie's dice is odd, then Ollie receives a number of points equal to the sum of his dice. And if the product of Eliza's dice is even, then Eliza receives a number of points equal to the sum of her dice. The first player to receive at least 12 points wins. Determine the probability that Ollie wins, and the probability that Eva wins.