MATH 6: MATH BATTLE

1. One bus left New York to Boston at 11am and arrived at 4pm; another bus left Boston at 12pm and arrived at New York at 5pm. The buses had a constant speed and did not stop (or got in traffic) on the way. At what time did the buses meet?
2. Determine in how many zeroes do the following numbers end: $10!, 20!, 30!$.
3. Solve the following identity:

$$A + AB + ABC = BCB$$

   Different letters correspond to different digits.
4. Two paper cards have 4 different digits written on them — one on each side of each card. Is it possible that every two-digit number one can get by combining these cards is prime?
5. Andrei wrote on the board 2020 fractions:

$$\frac{1}{2}, \frac{1}{3}, \frac{2}{3}, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \dots.$$

   Fractions that are less than $1/2$ were painted red and the rest of them blue. What is the difference between the number of red fractions and the number of blue fractions?
6. On a 6×6 board place 8 queens so that each of them beats only one queen.
7. The following figure consists of 7 squares. The side of the smallest square is equal to 1. Find the side of the square at the bottom left.