**Problem 1.** Three fair six-sided dice, each numbered 1 through 6, are rolled. What is the probability that the three numbers that come up are the side lengths of a triangle?

**Solution 1.** Let $p$ denote the desired probability and let the numbers that come up on the three dice be $x, y, z$. We calculate $1 - p$, that is, the probability that

$$x \geq y + z \quad \text{or} \quad y \geq x + z \quad \text{or} \quad z \geq x + y.$$

Because these three events are mutually exclusive and have the same probability, $1 - p$ is three times the probability that $x \geq y + z$. This happens with probability

$$\frac{0 + 1 + 3 + 6 + 10 + 15}{6^3} = \frac{35}{216}.$$

Thus,

$$p = 1 - 3 \cdot \frac{35}{216} = \frac{37}{72}.$$