MBMT Counting and Probability Round — Euclid
Answers

1. Kim Kardashian has 16 tops, 18 skirts, and 7 pairs of boots. How many ways can she choose an outfit if the outfit consists of 1 top, 1 skirt, and 1 pair of boots?
Answer: 2016

2. Eric has 6 cats. Their names are A, B, C, D, E, and F. If Eric randomly chooses 2 cats to go shopping with him, what is the probability that he takes F?
Answer: $\frac{1}{3}$

3. Rose has 2016 coins. She flips them all at once, and removes all the coins that are tails. She then flips the rest of the coins once more, and removes the coins that are tails. On average, how many coins are remaining (not removed)?
Answer: 504

4. A coin is flipped 8 times and its sequence of heads and tails is recorded. What is the probability that the sequence doesn't contain "HT"?
Answer: $\frac{9}{256}$

5. Thomas wants to order a pizza. For toppings, there are 4 types of meats available, 3 types of vegetables, and 2 types of extra cheese. He can choose at most 1 type of meat, at most 1 type of vegetable, and at most 1 type of extra cheese, but he wants at least one meat, vegetable, or extra cheese. How many ways can he order his pizza?
Answer: 59

6. A coin lands on heads with probability $\frac{4}{5}$ each time it is flipped. If you flip the coin twice, what is the probability that you will get different results on your two flips?
Answer: $\frac{8}{25}$

7. A ladybug starts on vertex A of hexagon $ABCDEF$. Every minute it randomly chooses one of the vertices that it is not on and walks to it. On average, how many minutes will it take for the ladybug to reach vertex B?
Answer: 5

8. How many ways can a set of 3 not necessarily distinct numbers be chosen from the set of integers from 0 to 9? Two such sets are 5,2,4 and 0,0,7, but 2,4,5 is considered the same as 5,2,4.
Answer: 220