

MBMT Probability/Combinatorics Round — Euler

Full Name _____

Team Number _____

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

This round consists of **8** questions. You will have **30** minutes to complete the round. Each question is worth the same number of points. Please write your answers in the simplest possible form.

1. Mr. Rose has 10 different pairs of shoes. For mismatch day, he wants to wear a left shoe on his left foot and a right shoe on his right foot, but he wants the shoes to be from different pairs. In how many ways can he do this?
2. The basketball team Vishnu's Gods (12 players) is playing against Sreenivasan's Rams (10 players). After the game, if each player shakes hands with every player on the opposing team, and then all players shake hands with the two referees, how many total handshakes are there?
3. A science teacher grades each assignment with probability 50%. If he assigns 8 assignments, what is the probability that he grades more than half of them?
4. Mr. Rose assigns an 8-page packet for homework. Guang randomly chooses a nonempty subset of the 8 pages to complete. What is the probability that the pages he completes are consecutive? (Any subset consisting of only one page is considered consecutive.)
5. You draw a card from a standard 52-card deck, but don't look at it. You then draw two more cards, and notice that neither of them are spades. What is the probability that the first card was a spade? (Note: there are 13 spades in a standard 52-card deck.)
6. Connie chooses a random real number between 0 and 2. Ten other people each choose a random real number between 0 and 1. What is the probability that the number that Connie chooses is the greatest?
7. Adrian rolls a standard 6-sided die, and records the results. What is the probability that he rolls a 1 ten times before he rolls a 6 twice?
8. Alice keeps rolling a standard 6-sided die until she rolls a 1. Bob keeps flipping a fair coin until it lands heads. What is the probability that Bob flips the coin at least as many times as Alice rolls the die?