MBMT Counting and Probability Round — Gauss

April 7, 2018

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 *not* worth the same number of points. Questions answered correctly by fewer competitors will be weighted more heavily. Please write your answers in a reasonably simplified form.

_____ **1** Artemis, Zeus, and Poseidon are betting on the outcome of rolling a six-sided fair die. Artemis bets that it will be a 2, Zeus bets that it will be odd, and Poseidon bets that it will be a multiple of 3. Who is most likely to be correct?

_____ **2** A pie is covered with various toppings. Strawberries cover 50% of the pie, blueberries cover 40% of the pie, and 25% of the pie has neither topping. What percentage of the pie has both toppings?

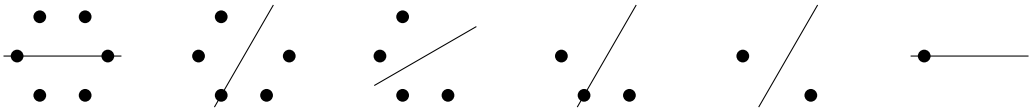
_____ **3** Jimmy rolls a six-sided die over and over until he gets a number less than 5. Jommy rolls a six-sided die over and over until he gets a number greater than 2. Then, they each write down their number. What is the probability that the sum of their two numbers is equal to 7?

_____ **4** Tom is stringing red, blue, and green beads on a straight wire. A red bead can be followed by any color of bead. A blue bead can only be followed by a blue or green bead. A green bead can only be followed by a green bead. If the wire has to have 6 beads, in how many ways can Tom string the beads? Note that not all colors have to be used.

_____ **5** There are 4 clubs at Blair: the Saxophone, Tambourine, Engineering, and Math clubs. Each club selects another club to be their archnemesis. What is the probability that no two clubs select each other as archnemeses?

_____ **6** In a draft, several people take turns picking a person from a group to be on their team. Mr. Schwartz is picking a three-person team from a 12-person draft. Mr. Schwartz is intentionally trying to get Alice, Bob, and Claire onto his team, while the other people drafting are picking randomly. If Mr. Schwartz gets the 4th, 8th, and 10th picks, what is the probability Mr. Schwartz gets the exact team he wants?

_____ **7** Six identical chocolates are arranged in a hexagonal shape on a plate. How many ways can they be eaten, one by one, so that the shape of the remaining chocolates always has at least one line of symmetry? One order in which the chocolates could be eaten (with lines of symmetry) is shown below:



_____ **8** Alice wants to tile an equilateral triangle of side length 10 with strips of three and four equilateral triangles (shown below) of side length 1. What is the minimum number of pieces she needs to accomplish this?