MBMT Algebra Round — Cantor

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** Guang has one pair of Yeezys. At the end of every six months, he buys three more pairs of Yeezys. How many months pass until Guang first has more than 10 pairs of Yeezys?

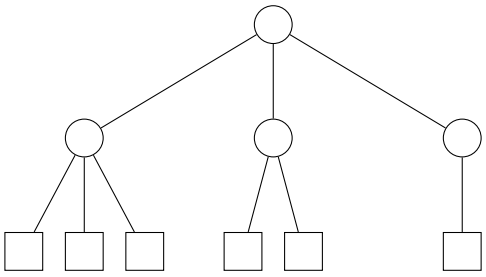
_____ **2** UMBC and UVA are playing a basketball game. If UMBC scores 12 three-pointers, 14 two-pointers, and 10 free throws (worth one point), while UVA scores 4 three-pointers, 19 two-pointers, and 4 free throws, then by how much did UMBC beat UVA?

_____ **3** To test Bob's memory, Alice tells Bob the numbers 1 through 10 in some order, but she skips one number. Bob is supposed to, in return, tell Alice the skipped number. Bob doesn't have a great memory, but he is clever, so he sums up the numbers Alice tells him. If Bob gets a sum of 50, what is the missing number?

_____ **4** Julia and Jasmine evenly split a cake that is 30% frosting and 70% non-frosting. If Julia's portion is 50% frosting, what percent of Jasmine's portion is frosting?

_____ **5** Guang is reading a book with 500 pages. Each day, he reads one page. On every Thursday, in addition to reading a new page, Guang re-reads (reviews) every page he's read so far. If each page takes one minute to read, how many minutes does Guang spend reading in ten weeks?

_____ **6** Consider the following diagram. Steven places the numbers 1, 2, 3, 4, 5, and 6 in the squares, and writes in each circle the average of the numbers below it. What is the positive difference between the maximum and minimum possible values written in the top circle?



_____ **7** Guang's watch runs 1% slower than normal time. Luckily, he resets the time on his watch to be equal to the actual time at 6 AM, 11 AM, 4 PM, and 10 PM every day. What is the maximum difference in seconds ever achieved between the time on Guang's watch and the actual time?

_____ **8** If $a^2 + 2b^2 = 72$ and $(a + 2b)^2 = 144$, and neither a nor b is equal to 0, find ab.