

# MBMT Number Theory Round – Ramanujan

April 1, 2017

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 by fewer competitors will be weighted more heavily. Please write your answers in the simplest possible form.

- \_\_\_\_\_ 1 What is the smallest integer greater than 10 that leaves a remainder of 1 when divided by 4?
- \_\_\_\_\_ 2 The sequence 5, 7, 11, 19, 35, ... is formed by multiplying the previous term by 2 and subtracting 3. What is the 6th term in the sequence?
- \_\_\_\_\_ 3 How many integers between 1 and 100 inclusive are divisible by 4?
- \_\_\_\_\_ 4 What is the greatest common factor of 91 and 78?
- \_\_\_\_\_ 5 Let  $\overline{201A}$  be a four-digit number that is divisible by 3. Find the sum of all possible values of  $A$ .
- \_\_\_\_\_ 6 The sum of two prime numbers is 30. Find the largest possible product of the two primes.
- \_\_\_\_\_ 7 Guang loves having Mighty Wings and Shamrock Shakes at McDonalds. He orders Mighty Wings every 3 days and Shamrock Shakes every 4 days. In a period of 28 consecutive days, what is the most number of days where he orders both Mighty Wings and Shamrock Shakes?
- \_\_\_\_\_ 8 Mr. Stein wants to buy some Munchkins from Dunkin' Donuts. They sell Munchkins in packages of 5 and 8. What is the largest integer number of Munchkins that Mr. Stein can't buy?