MBMT Number Theory Round — Erdös

March 9, 2025

Full Name _____

Student ID 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.** What is the smallest positive three-digit integer that is a multiple of 5, but not a multiple of 2 or 3?

_____ **2.** What is the second-smallest positive integer that is a multiple of both 4 and 6?

_____ **3.** Evan bakes seventy cookies. He can put the cookies in bags with either six cookies or ten cookies per bag. How many more *completely full* bags would he have if he put six cookies in each bag than if he put ten cookies in each bag?

_____ **4.** What is the smallest positive integer N such that its value is 5 times the sum of its digits?

_____ **5.** Alice's answer to her math homework has been eaten by her pet ants, who only eat their favorite digit. Her answer is now $7X91X8$ where X is a missing digit. If Alice remembers that her answer was divisible by 12, what digit did the ants eat?

_____ **6.** Shriyan divides his favorite three-digit number by 2, 3, 4, 8, 9, and 11 and gets a remainder of 1 each time. What is Shriyan's favorite three-digit number?

_____ **7.** Three *consecutive* nonzero digits are taken, and the 6 numbers formed by permuting the digits are added. What is the largest integer that must divide the sum?

_____ **8.** Let $\lfloor x \rfloor$ represent the largest integer less than or equal to x. There exists a unique 5-digit positive integer n such that the sum of its digits is 20 and

$$\left\lfloor \frac{n}{10} \right\rfloor + \left\lfloor \frac{n}{100} \right\rfloor + \left\lfloor \frac{n}{1000} \right\rfloor + \left\lfloor \frac{n}{10000} \right\rfloor = 2025$$

What is the product of the digits of n?