

MBMT Number Theory Round — Euclid Answers

_____ 1. What is the remainder when $6!$ is divided by 7?

Answer: 6

_____ 2. How many integers between 0 and 100 have a remainder of 1 when they are divided by 5?

Answer: 20

_____ 3. Alex has a dumpling cart with n dumplings. He is going to a potluck with either 4, 5, or 7 other people. Given that n is the smallest positive integer number of dumplings such that everyone at the potluck, including himself, can get an equal number of dumplings with none left over, find n .

Answer: 120

_____ 4. Find the sum of the positive divisors of 2016 that are multiples of 6.

Answer: 5952

_____ 5. Sarah has n tomato seeds to plant. If she plants them in rows of 9 seeds each, she'll have 2 left over. If she plants them in rows of 10, she'll have 1 left over. If $50 < n < 150$, what is n ?

Answer: 101

_____ 6. What is the 200th positive integer that is not a multiple of 2, 3, or 5?

Answer: 749

_____ 7. Let a, b be integers such that $|a|, |b| \leq 2016$. Furthermore, let b be an odd integer. Find the number of ordered pairs (a, b) such that $a^2 - 2b^2 = 1$.

Answer: 0

_____ 8. Let a_n be a sequence such that $a_0 = 3, a_1 = 3^3, a_2 = 3^{3^3}, a_3 = 3^{3^{3^3}}, \dots$. Find the units digit of a_{2016} .

Answer: 7