

# MA $\Theta$ Competition Team Problem Set 9

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January 17, 2025

**Problem 1.** Jiwu starts his TFT game at exactly 3:19 a.m. If he plays for 1524 minutes, when will he end his gaming session?

**Problem 2.** Find the last digit of  $7^{100}$ .

**Problem 3.** Find the smallest positive integer  $x$  such that

$$x \equiv 1 \pmod{3},$$

$$x \equiv 4 \pmod{5},$$

$$x \equiv 6 \pmod{7}.$$

**Problem 4.** The base-nine representation of the number  $N$  is  $27,006,000,052_{\text{nine}}$ . What is the remainder when  $N$  is divided by 5?

**Problem 5.** Find the last two nonzero digits of  $90!$ .

**Problem 6.** Let  $N = 123456789101112 \dots 4344$  be the 79-digit number that is formed by writing the integers from 1 to 44 in order, one after the other. What is the remainder when  $N$  is divided by 45?