

What is the tens digit in the sum  $7! + 8! + 9! + \cdots + 2006!$ ?

(A) 1

(B) 3

(C) 4

(D) 6

(E) 9

**2006 AMC 10 B, Problem #11—**

**“What do we know about the number of 2’s 5’s and 10’s in  $n!$ ?”**

**Solution (C)** Since  $n!$  contains the product  $2 \cdot 5 \cdot 10 = 100$  whenever  $n \geq 10$ , it suffices to determine the tens digit of

$$7! + 8! + 9! = 7!(1 + 8 + 8 \cdot 9) = 5040(1 + 8 + 72) = 5040 \cdot 81.$$

This is the same as the units digit of  $4 \cdot 1$ , which is 4.

**Difficulty:** Medium-hard

**NCTM Standard:** Problem Solving Standard: apply and adapt a variety of appropriate strategies to solve problems

**Mathworld.com Classification:** Discrete Mathematics > Combinatorics > Permutations > Factorial