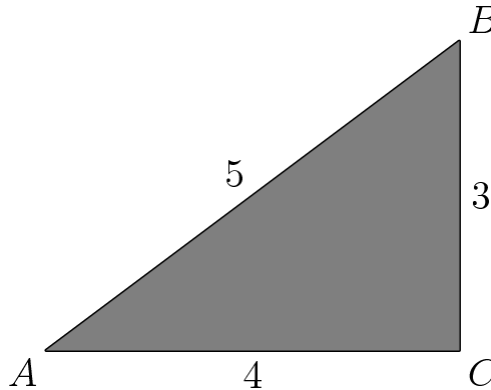# Problem Set - 19 Jan 2024

PROBLEM 1 (2018 AMC 10A #13)

A paper triangle with sides of lengths $3, 4$, and 5 inches, as shown, is folded so that point A falls on point B. What is the length in inches of the crease?

(**A**) $1 + \frac{1}{2}\sqrt{2}$ (**B**) $\sqrt{3}$ (**C**) $\frac{7}{4}$ (**D**) $\frac{15}{8}$ (**E**) 2

PROBLEM 2 (2011 AMC 12B #13)

Brian writes down four integers $w > x > y > z$ whose sum is 44. The pairwise positive differences of these numbers are $1, 3, 4, 5, 6$ and 9. What is the sum of the possible values of w?

(**A**) 16 (**B**) 31 (**C**) 48 (**D**) 62 (**E**) 93

PROBLEM 3 (2010 AMC 12B #11)

A palindrome between 1000 and $10,000$ is chosen at random. What is the probability that it is divisible by 7?

(**A**) $\dfrac{1}{10}$ (**B**) $\dfrac{1}{9}$ (**C**) $\dfrac{1}{7}$ (**D**) $\dfrac{1}{6}$ (**E**) $\dfrac{1}{5}$

PROBLEM 4 (2018 AIME I #12)

For every subset T of $U = \{1, 2, 3, \ldots, 18\}$, let $s(T)$ be the sum of the elements of T, with $s(\emptyset)$ defined to be 0. If T is chosen at random among all subsets of U, the probability that $s(T)$ is divisible by 3 is $\frac{m}{n}$, where m and n are relatively prime positive integers. Find m.

PROBLEM 5 (2015 AIME I #13)

With all angles measured in degrees, the product $\prod_{k=1}^{45} \csc^2(2k-1)° = m^n$, where m and n are integers greater than 1. Find $m + n$.