

**2013 HUDDLE PROBLEMS**

**Problem 1.** For a real number  $x$ , the notation  $\lfloor x \rfloor$  represents the result of rounding  $x$  down to the nearest integer. For example,  $\lfloor 3.9 \rfloor = 3$  and  $\lfloor 7 \rfloor = 7$ . Evaluate

$$\lfloor \log_{10}(1) \rfloor + \lfloor \log_{10}(2) \rfloor + \lfloor \log_{10}(3) \rfloor + \cdots + \lfloor \log_{10}(999) \rfloor.$$

**Problem 2.** Bobbo, Carly, and Drake make the following statements:

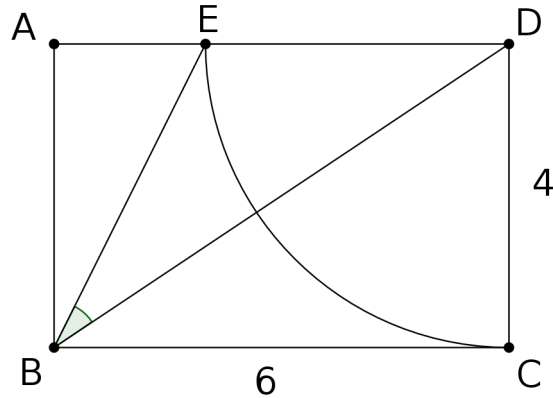
**Bobbo:** Drake is telling the truth and the number 317 is prime.

**Carly :** If Bobbo is lying, then  $\pi > \frac{22}{7}$ .

**Drake:** Exactly one of Bobbo and Carly is lying.

How many people are lying?

**Problem 3.** In the diagram below,  $ABCD$  is a rectangle, and the arc from  $E$  to  $C$  is a quarter of a circle centered at  $D$ . Find  $\tan(\angle EBD)$ .



**Problem 4.** The cube of a positive integer  $x$  is a 5-digit integer whose first and last digits are 7. Find  $x$ .