

OWOMO

PROBLEMS

June 2024

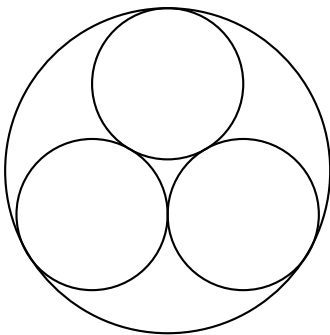


# 1 Info

- These guys are NOT integers, sometimes.
- At worst the questions are like AIME question 5 difficulty probably
- They increase in difficulty?? maybe???
- Simplify your answers if you feel like it
- Have fun :)

### Problem 1

The small circles have radius 2, what is the radius of the big circle?



### Problem 2

$f(x)$  returns the sum of the digits of  $x$  choose two. For example,  $f(23) = \binom{2}{2} + \binom{3}{2} = 4$ . For how many positive integers  $x$  less than 100 is  $f(x)$  even?

### Problem 3

A *sus* number is a integer palindrome with a zero in the middle-most digit. A polynomial has all *sus* 5-digit numbers as roots. What is the smallest possible positive coefficient in this function if the coefficient of  $x^{89}$  is negative and *sus*?

### Problem 4

A point starts at the center of a regular hexagon of side length 4. It can move in a line and bounce off the edges. If it hits the hexagon three times such that it ends back up in the center and traces out a quadrilateral with positive area, how far did it travel?