Team Number:

1. How many different ordered pairs (x, y) of positive integers satisfy the equation $3x + 7y = 100$?

Team Number:

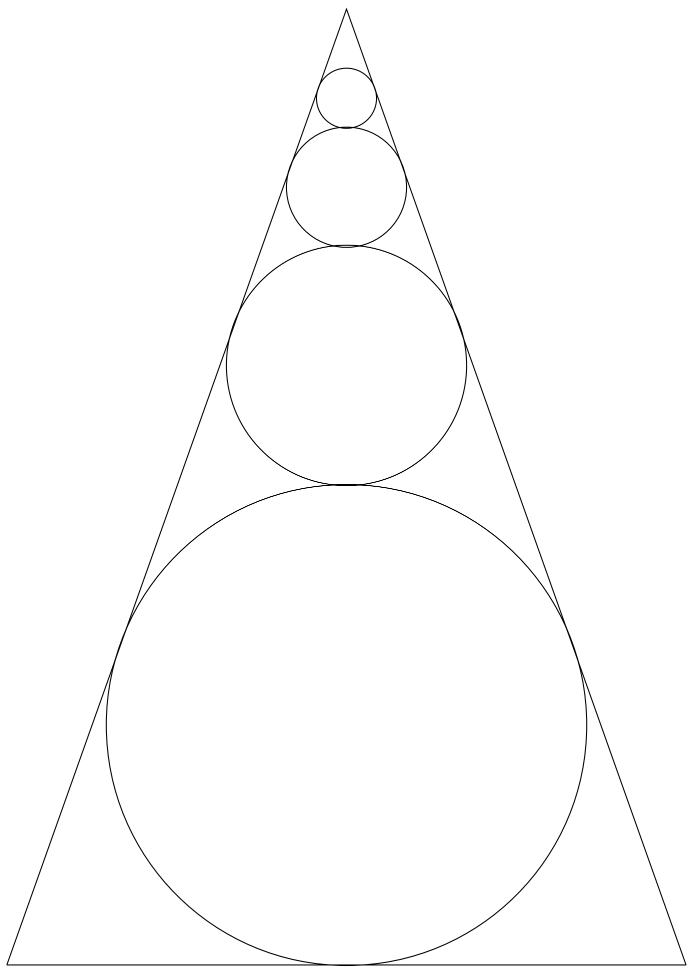
2. Frank and Jeremy are playing a card game to determine the champion of the world. They agree to play a series of five games; whoever wins three or more will be the champion. If the probability of Jeremy winning each game is given by $\frac{2+5f-3f^2}{4}$, where f is the number of games that Frank has already won, what is the probability that Jeremy will become the champion?

Team Number:

3. A high school math class with 20 students is walking down a hallway when they see 20 closed, but unlocked, lockers along the wall, numbered 1 through 20. The first student to go down the hall opens all of the lockers. The second wants to be different, and so they go down and close the even numbered lockers $2, 4, 6, \ldots, 20$, but leave the odd numbered lockers alone. The third student notices a pattern is forming, so they decide that they want to follow it, and they go along and flip the lockers that are multiples of 3, that is, $3, 6, 9, 12, \ldots, 18$, in other words, they open the locker if it was closed, but close it if it was open. They continue in this pattern: the fourth student flips lockers $4, 8, 12, \ldots$, that is, all the multiples of 4, the fifth student all multiples of 5, etc. Which lockers are left open after the math class is finished having their fun?

Team Number:

4. In the figure, an infinite tower of circles is inscribed in an isosceles triangle. Each circle is externally tangent to the one above it, and each has twice the radius of the one above it. If the bottom circle has radius 1 and the base of the triangle has length $2\sqrt{2}$, find the triangle's area.



Team Number:

5. Suppose that $x = 2$ is a root of the cubic polynomial $x^3 + 3x^2 + bx + 6$. Find b.