# UW Math Circle
April 9, 2015
Homework

1. Two volumes of William Shakespeare stand on a bookshelf next to each other: volume one, then volume two. Each volume is 4 cm thick (pages + two covers), and has two covers, each 0.5 cm thick. A bookworm starts on page 1 of volume one and munches his way in a straight horizontal line through to the last page of volume two. What distance does the worm travel?
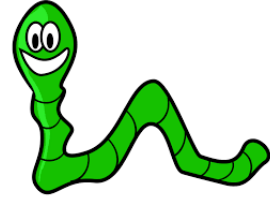
2. How can seven trees be planted such that there are six sets of exactly three trees in a straight line?

3. How many squares can be drawn on an $n \times n$ grid? (The squares can have side lengths ranging from 1 unit to n units, and their sides must be on the lines of the grid.) Prove your answer is correct!

4. Suppose you have a 3×3 grid filled with positive numbers such that

   - the product of the numbers in each row is 1
   - the product of the numbers in each column is 1
   - the product of the numbers in each 2×2 square is 2

   What number is in the center of the square?
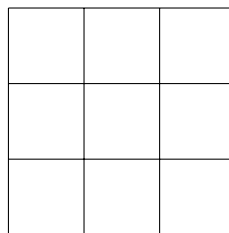
5. Show that if the squares of a 5×5 checkerboard are arbitrarily colored black and white, then there are four squares of the same color that form the corners of a rectangle.