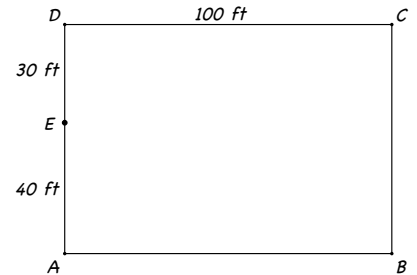# Ninth Annual Upper Peninsula
High School Math Challenge

Northern Michigan University (Marquette, MI, USA)
Saturday April 14, 2018

Team Problems

1. The figure at the right represents a rectangular room with an electrical outlet located at E. If a point in the room is chosen at random, what is the probability that a 50-foot extension cord will reach that point?

2. The graph of $g(x) = c$ intersects the graph of $f(x) = |x^2 - 5|$ at exactly three points. Find the numeric coordinates of the three points of intersection.

3. If $(x + x^{-1}) = 3$, $(x^2 + x^{-2}) = a$, and $(x^3 + x^{-3}) = b$, find the numerical value of $a + b$.

4. How many perfect squares are divisors of the product $(1! \times 2! \times 3! \times \cdots \times 9!)$?

5. A square is divided into three pieces of equal area by making two parallel cuts, as shown. The distance between the parallel lines is 10 inches. What is the area of the square?