WEEK 1

Problem 1. (Putnam 2002-A2) Given any 5 distinct points on the surface of a sphere, show that we can find a closed hemisphere which contains at least 4 of them.

Problem 2. (Math 1187h Fall '24) How many positive integer divisors does 10! have?

Problem 3. (Putnam 1986-B1) ABCD is a rectangle. AEB is an isosceles triangle, with E on the opposite side of AB to C and D, which lies on the circle through A, B, C, D. This circle has radius 1. For what value(s) of $|AD|$ do the rectangle and triangle have the same area?

Problem 4. (Euclid) Prove that the medians of any triangle intersect at one point (called the centroid or center of mass).

Problem 5. Prove that the heights (also called altitudes) of any triangle intersect at one point (called the othrocenter).

Date: August 28, 2025.