# Mathematics Olympiad
# Pennsylvania State University Hazleton

# FALL 2009

**Problem 1.** Prove that there are infinitely many numbers ending in 2008 which are divisible by 2009.

**Problem 2.** Show that every polynomial is the difference of two increasing polynomials.

**Problem 3.** Show that $2009^{2010} > 2010^{2009}$.

**Problem 4.** Let $ABCDA_1B_1C_1D_1$ be a cube, and let $K \in A_1B_1, L \in BC, M \in DD_1$. Draw the plane that passes through the points $K, L, M$. (Draw the polygon by which this plane intersects the cube's sides.)

**Problem 5.** Show that there exists such a number $N$ that the numbers $N, N+1, N+2, \ldots, N+2009$ are all composite.

**Problem 6.** Is the number $\sqrt{2}+\sqrt{3}+\sqrt{5}+\sqrt{6}$ rational or irrational?