PROBLEM SET # 12
MATH 114

Due April 27.

1. Trisect the angle of 18° by ruler and compass.

2. Let l be the least common multiple of m and n. Assume that regular m-gon and regular n-gon are constructible by ruler and compass. Prove that regular l-gon is also constructible by ruler and compass.

3. Find the minimal equation over for $\cos\frac{2\pi}{7}$ over $\mathbb{Q}$. Hint: express $\cos\frac{2\pi}{7}$ in terms of 7-th roots of 1.

4.

(a) Prove that the angle of 25° is not constructible by ruler and compass;

(b) Prove that angle of n° is constructible by ruler and compass if and only if n is a multiple of 3.

5. Given three segments a, b and c, construct a triangle whose altitudes equal a, b and c.

6. Let $f(x)$ be an irreducible polynomial over $\mathbb{Q}$ of degree 7. Assume that $f(x)$ has exactly three real roots. Prove that $f(x)$ is not solvable in radicals.

Date: April 19, 2006.