Spring 2010 Polynomials Homework-Assignment 2 **Name:** _____

Write-up your solution carefully including all the details of the proof. Due Tuesday September 21.

Please staple your assignment.

1. **(5 points) Solve $x^3 - x + 1 = 0$.**

2. **(5 points) Solve $x^4 = -4$ by using the general method of solving equations of degree 4.**

3. **(5 points) For all complex numbers $z \neq 0$ show that**

$$\frac{z}{|z|} + \frac{|z|}{z}$$

is a real number.

4. **(5 points) Let $f(x) = kX^k - X^{k-1} - X^{k-2} - \ldots - X - 1$, where $k \geq 1$ integer.**

Show that the roots of f have the absolute value less or equal to 1.

5. **(5 points)(graduate students) Show that for all positve integers n the real roots of the following equation:**

$$x^{2n+1} - x^{2n} + x^{2n-1} + 2nx^n - n^2 = 0$$

are positive.