**Fall 2010 Polynomials Homework-Assignment 4** **Name:** _____

**Write-up your solution carefully including all the details of the proof. Due October 21. Please staple your assignment.**

(1) (5 points) Compute the center of mass of the roots of $z^7 - 3z^6 + 2z^5 + z^4 - 3z^3 + 3z^2 - 3z + 2$ with respect to 0.

(2) (5 points) Show that $z^7 - 3z^6 + 2z^5 + z^4 - 3z^3 + 3z^2 - 3z + 2$ has at least one root with absolute value greater than 1.

(3) (5 points)
Construct an example of a polynomial of degree $f$ at least 3 such that it has one simple root $z_0$ with the property that $f"(z_0) = 0$.

(4) (5 points)
Use Laguerre Criterion to show that $z^2 - 3z + 2$ has real roots.

(5) (5 points)(graduate students)
Use Viete relations together with the criterion for stability for a polynomial with real coefficients to decide whether $z^3 + 2z^2 + 3z + 2$ is stable.