MA 330 ASSIGNMENT # 4

Answers to problems may be handwritten.

(1) Provide a detailed, careful proof that the solutions to the equation $ax^2 + bx + c = 0$ are given by the quadratic formula.
(2) Use the Intermediate Value Theorem to show that every cubic polynomial has a real root.
(3) Consider the equation $z^3 + az^2 + bz + c = 0$. Show that the substitution $x = z - \frac{a}{3}$ results in a cubic equation with no x^2 term. Explain why, if you can find solutions to cubic equations with no x^2 term, then you can find solutions to any cubic equation.
(4) Consider Figure 11 on page 150 of Episodes in the Mathematics of Medieval Islam. Explain, in your own words, why the length labeled y is a solution to the cubic equation $y^3 + my = n$.