MAE 301/501 HOMEWORK–3 DUE AT THE BEGINNING OF CLASS ON THURSDAY, SEPTEMBER 19

One goal for this course is for you to develop your skill in effectively communicating mathematics. With this in mind, you should clearly write up your solutions. Solutions with little or no justification will receive little or no credit.

(1) Solve this problem, taken from a Regents exam:

If $(x-1)$ is a factor of $x^3 - kx^2 + 2k$, what is the value of k?

(2) Let $f(x) = ax^2 + bx + c$ be a function mapping $\mathbb{R} \to \mathbb{R}$. Find conditions on a, b and c so that $f(x) > 0$ for all real numbers x.

(3) Let $f(x) = ax^2 + bx + c$ be a function mapping $\mathbb{R} \to \mathbb{R}$. Find conditions on a, b and c so that $f(x) > 1$ for all real numbers x.

(4) Let $P = x^4 + x^2 - x + 1$ and let $Q = x^7 - 3x^3 + 1$. Find polynomials R and S so that $Q = RP + S$.

(5) Think about how the Euclidean algorithm could be modified to determine the greatest common divisor of three (or more) non-zero integers. Explain your ideas and apply them to an example.