PRACTICE QUESTIONS FOR TEST 2

Q1. For each of the following polynomials, do the following: find the possible number of positive and negative roots (using Descartes' rule), find an upper bound for the modulus of an arbitrary root, and find all possible rational roots.

Finally find *all* the roots of the polynomial.

$$2\,x^3 - x^2 + 9\,x + 5, \qquad 4\,x^4 + 13\,x^2 - 12\,x^3 - 12\,x + 9,$$
$$x^6 + 2\,x^3 - 15, \qquad 5\,x^4 - 44\,x^3 + 76\,x^2 - 13\,x - 6.$$

Q2. In each of the following cases, the augmented matrix for a system of equations is given. Solve the system using either Gaussian elimination or Gauss-Jordan elimination.

Assume that the variables are named $x_1, x_2, x_3, \ldots$ etc.

$$\left[\begin{array}{rrrr|r} 4 & 3 & -9 & 1 & 1 \\ -1 & 2 & -13 & 3 & 3 \\ 3 & -1 & 8 & -2 & -2 \end{array}\right], \quad \left[\begin{array}{rrr|r} 3 & 2 & 1 & 3 \\ 2 & 1 & 1 & 0 \\ 6 & 2 & 4 & 6 \end{array}\right], \quad \left[\begin{array}{rrr|r} -1 & 1 & 2 & 2 \\ 3 & -1 & 1 & 6 \\ -1 & 3 & 4 & 4 \end{array}\right]$$

Be very careful with your row-operations. The only key to mastering Gaussian elimination is a lot of practice. Always check your solution by substituting into the original equations.