Fifth Quiz for Math 30, section 6432

Directions: You should fully justify your answers. Do all your work on separate paper, and make sure to *print* your name in the first sheet and staple all the sheets together. **Unstapled, loose pieces of paper will not be graded.** This quiz is due Wednesday April 2, at 6:00 PM.

1. Use Descartes's rule of signs to determine the possible number of positive and negative zeros of the following polynomials:
   (a) $x^3 + 2x^2 + 3x + 4$
   (b) $3x^4 - 3x^3 + 2x^2 + 4x + 7$
   (c) $-5x^5 - 4x^4 + 3x^3 + 2x^2 + x + 23$
   (d) $-5x^5 + x^4 - 3x^3 - 10x^2 + 29x - 32$

2. Prove that the following polynomial has at least two non-real roots:
$$2x^7 - 11x^6 - 71x^5 + 450x^4 + 1740x^3 + 1189x^2 + 728$$

3. For each of the following rational functions find the domain, possible x and y intercepts as well as all possible asymptotes.
   (a) $f(x) = \dfrac{2x+2}{x^2-3x-4}$
   (b) $f(x) = \dfrac{x^2+x-6}{x^3+3x^2-4x}$
   (c) $g(x) = \dfrac{x^2+2x+5}{x+2}$
   (d) $h(x) = \dfrac{3x^2-9x+6}{2x^2+6x+4}$

4. Solve the following inequality using the "graphing method".
$$x^4 + 4x^3 + 3x^2 \geq 4x + 4$$

5. Solve the following inequality using the "test points" method.
$$\frac{x^2-2x-15}{x^2+2x-15} \geq 0$$

6. Solve the following inequality using the "table of signs" method.
$$\frac{(x-1)(x+1)(x+2)}{x-2} < 0$$