Bring the completed test with you when you come to your testing center to take Test 3.

1. (5 pts) For each of the following polynomials, give an end behavior graphic, for instance, ↙⋯↘

    a. $f(x) = -3x^3 + 7x^2$

    b. $g(x) = 25x^4 - 15x^2 + 5$

Let $f(x) = 4x^5 - 12x^4 - 5x^3 + 21x^2 - 11x - 21$ for the remainder of this test.

2. (5 pts) What does Descartes' Rule of Signs tell you about positive and negative zeros (roots) of f?

3. (5 pts) Use the Rational Zeros (Roots) Theorem to list the possible rational zeros of f.

4. (5 pts) Show that $x = 5$ is an upper bound on real zeros for f.

5. (5 pts) Find all real and complex zeros of . $f(x) = 4x^5 - 12x^4 - 5x^3 + 21x^2 - 11x - 21$. Show the breakdown by synthetic divisions, step by step. Do your work on separate paper, and only show *me* the guesses that *worked*. Neatness counts. No credit for sloppy work.

6. (5 pts) Factor *f* over the *REAL* number field. (Involves an *irreducible* quadratic factor.)

7. (5 pts) Factor *f* over the *COMPLEX* number field. (All linear factors.)

8. (5 pts) Use the work you've done to sketch the graph of *f* showing all intercepts. A *smooth* graph is the goal, here. I'm looking for the essence of the thing. For clues on this, look at the old Take Home Test I sent you in e-mail, the other day.

9. (5 pts) Discuss how you used your work to help build the graph. I'm particularly interested in behavior near *x*-intercepts and end behavior.