Use separate paper to do the work on this take-home test. Start a fresh sheet of paper to show work on #4. Use paper without lines. Use only one side of each sheet of paper. *I will not grade work written on the backs of pages*. I will not grade work that is sloppy. I will not grade work that is hidden behind a staple.

Write clearly and make sure your pencil work is *dark*. If I can't read it, I won't grade it.

Let $f(x) = 4x^4 + 12x^3 - 34x^2 + 28x - 10$. We'll say everything we can about this polynomial that's worth saying.

1. (5 pts) Describe the end behavior of the graph of f with a simple graphic.

2. (5 pts) Use Descartes' Rule of Signs to determine the *possible* number of positive and negative zeroes of f.

3. (5 pts) Use the Rational Zeroes Theorem to determine the *possible* rational zeroes of f.

4. (5 pts) Informed by your work, above, *and a graphing utility of some sort*, use synthetic division to find the zeros. Each time you find a zero, it *should* reduce (depress) the question by one degree. Each time you find a zero, you should thereafter be working with a *depressed polynomial* that is of lesser degree.

5. (5 pts) From you work, above, factor f over the real numbers. This will involve an irreducible quadratic factor.

6. (5 pts) From your work above, factor f over the complex numbers. This should split f into linear factors.

7. (5 pts) Give a rough sketch of f that shows all intercepts.

8. (5 pts) Sketch the graph of $R(x) = \dfrac{x^2 - 5x - 6}{x^2 - 5x + 6}$. Show all asymptotes, intercepts and any holes.

9. (5 pts) The graph of $g(x) = \dfrac{x^3 - 9x^2 + 14x + 24}{x^3 - 9x^2 + 26x - 24}$ differs from the graph of f, in #8, in only one small detail.

    Sketch the graph of g, showing all asymptotes, intercepts and holes.

10. (5 pts) Sketch the graph of $h(x) = \dfrac{2x^2 - 5x - 3}{x - 4}$, showing all asymptotes, intercepts and holes.