MAT 121 Spring, 2011

Test 3, Chapter 3 80 Points Name_____________________________

1. (10 pts) Form a polynomial in factored form with *real* coefficients with the given zeros and degree. Please do not expand the polynomial.

Zeros: 2, multiplicity 2; - 3, multiplicity 2. Degree 4.

2. (5 pts) Expand $(x+(2-3i))(x+(2+3i))$

3. (5 pts) Use synthetic division to find $P(3)$ if $P(x)=2x^5-3x^3+3x^2-4x+13$.

4. (5 pts) Divide $f(x)=x^4-3x^3+2x^2+5$ by $d(x)=x^2-2$. Then write the result in the form $\mathit{Dividend}=\mathit{Divisor}\cdot\mathit{Quotient}+\mathit{Remainder}$.

5. Let $f(x) = 2x^5 - 20x^4 + 56x^3 + 16x^2 - 256x + 256$, and suppose its factored form is given by $f(x) = 2(x-2)^2(x+2)(x-4)^2$

a. (5 pts) List each real zero and its multiplicity. Determine whether the graph of $f(x)$ touches or crosses the x-axis at each x-intercept.

b. (5 pts) What power function does f resemble for large values of $|x|$? In other words, give the end behavior for f, along with a simple diagram.

c. (5 pts) Use your work, above, to help you sketch the graph of $f(x)$, showing all intercepts (including the y-intercept).

6. Use your sketch from the previous problem to help you solve the following inequalities. You might want to re-sketch it, below, just to have it on the same page.

   a. (5 pts) $2(x-2)^2(x+2)(x-4)^2 \le 0$

   b. (5 pts) $\dfrac{2(x-2)^2}{(x+2)(x-4)^2} \le 0$

7. (5 pts) Show that $x = 5$ is an upper bound on real zeros for $f(x) = x^4 - 5x^3 + 15x^2 - 5x - 26$.

8. (10 pts) Find the *real* zeros of $f(x) = x^4 - 5x^3 + 15x^2 - 5x - 26$. Factor f over the set of real numbers. Use scratch paper (the back of page 5) to make your guesses, and then use the *correct* guesses to break f down in the space, below.

9. (5 pts) Find the remaining zeros of f and factor f over the set of *complex* numbers.

10. (10 pts) Suppose $R(x)=\dfrac{x^3-8x^2+x+42}{x^3-x^2-10x-8}$ can be factored into $\dfrac{(x-3)(x+2)(x-7)}{(x+2)(x-4)(x+1)}$.

(It can.) Sketch the graph of R showing all intercepts, asymptotes and holes (if any).