

# MATH 152, HOMEWORK #6

## DUE THURSDAY, OCTOBER 6

Remember, consult the Homework Guidelines for general instructions. All problems listed by section and exercise number are from our textbook.

### GRADED EXERCISES:

1. Consider the polynomial  $f(x) = 4x^4 - 12x^3 - 35x^2 - 24x - 5$ .
  - (a) What does Descartes' Rule of Signs tell us about the  $x$ -intercepts of  $f$ ?
  - (b) Factor  $f$  as completely as possible using integer coefficients. You may use the Rational Root Theorem to assist you. (Show work involving polynomial long division, synthetic division, or my dots trick. For the dots, it's easier to just write the number of dots, rather than meticulously drawing a bazillion dots.) Identify all the zeroes of  $f$ , along with their multiplicities.
  - (c) Briefly describe the long run behavior of  $f$  (i.e. what happens as  $x$  goes to  $\pm\infty$ ). Without using technology, draw a sketch of  $f$  that incorporates all the information we have found so far. Set an appropriate scale and label the key features you found above.
2. Section 3.1, #1. Part (c) is rather slick. Try to think of finding your even and odd functions point by point, or rather, pair of points by pair of points. Suppose  $f$  is your arbitrary function and  $\mathcal{E}_f$  and  $\mathcal{O}_f$  denote the even and odd parts of  $f$ . If you know both the values  $f(c)$  and  $f(-c)$ , you should be able to determine  $\mathcal{E}_f(c)$ ,  $\mathcal{O}_f(c)$ ,  $\mathcal{E}_f(-c)$ , and  $\mathcal{O}_f(-c)$ .
3. Section 3.1, #4.
4. Section 3.1, #7.
5. Find all relevant features of the following rational function (intercepts, asymptotes, holes, and give a sketch of its graph (labeling all such features), without using technology.

$$\frac{x^3 - 6x^2 + 3x + 10}{3x^2 - 6x - 9}$$

6. Section 4.2, #2.

**MATH JOURNAL** – please submit on a separate page (not stapled to the rest of the homework), as this will go directly to Kelli, not the grader. Choose ONE of the following and write 1-3 paragraphs (no more than one page, please).

- What pitfalls do you encounter when using graphing calculators to study polynomial and rational functions? Where are they helpful, and where is it really critical to be able to work things out by hand?
- Reflect on any math education topic you have been thinking about. E.g., a really nice technique for teaching an idea, a situation working with a struggling student and how you handled it or wish you'd handled it, general insights on connecting with students, etc.

### UNGRADED HOMEWORK:

Section 3.1, Exercises 2, 5, 6, 8  
Section 3.2, Exercises 1, 2  
Section 3.3, Exercises 1, 2, 3, 4, 5  
Section 4.1, Exercises 1, 2, 3