**MAT 171 Polynomial Function Analysis Lab**

Value: 140 points, graded as best 14 out of 15 at 10 points each, the extra one counts as bonus.

Due: One week from today.

Directions: For each function below *neatly* do the following.

A (1pt) Demonstrate use of the Lead Term Test to identify the end behavior as same-vs-opposite and the right side as up-vs-down.

B (1pt) Demonstrate use of the DeCartes Rule of Signs to list the possible groupings of positive, negative, and complex zeros.

C (1pt) Demonstrate use of the Rational Root Test to list (unrepeated) all the potential rational zeros.

D (5pt) Demonstrate use of the Linear Factorization Theorem by (i) selecting divisors from the potential rational zeros, (ii) using synthetic polynomial division to check whether it is a zero, (iii) whenever it is a zero writing the function in partially factored form with all known factors, and (iv) repeating until the function is fully factored in linear factors. Hint: five of the functions have one conjugate pair of non-rational zeros (i.e. either real but irrational, or not real).

E (2pt) Plot and label all X and Y intercepts, and then sketch a graph of the function. Note: your X and Y axis scales need not be identical, nor even demarcated, but make sure to maintain proportionality.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 
11. 
12. 
13. 
14. 
15. 

Solutions:

End behavior Max Zeros Grouping Factored Form

L-v-R Right Total Pos Neg Compl

(deg) (coef) (deg) (DesCartes Rule)

1. same up 6 4 2 6 
2. same down 4 2 2 4 
3. opp. up 5 3 2 4 
4. same up 4 1 3 2 
5. opp. up 5 3 2 4 
6. same up 4 0 4 4 
7. opp. up 5 5 0 4 
8. same up 6 3 3 4 
9. opp. up 7 3 4 6 
10. same up 6 3 3 4 
11. same up 6 3 3 4 
12. same up 6 4 2 6 
13. opp. down 7 5 2 6 
14. same down 8 6 2 8 
15. same up 10 4 6 10 