

DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO

- ❖ Write your name below on the space provided.
- ❖ This test has a total of 5 pages.
- ❖ Work the problem in the space provided. If you need more space, write on the back of the test.
- ❖ To insure maximum credit, show your work. In general, full credit will not be given for unsupported answers.
- ❖ Look only at your test. Don't give me the impression that you are cheating.
- ❖ Be sure to write neatly. If I cannot read what was written, do not expect the problem to be graded. A pencil must be used on all tests. Otherwise, the test will not be graded.
- ❖ If you finish early, go over the test again.

Good luck!

Number	Maximum	Score
1	3	
2	14	
3	5	
4	6	
5	2	
6	6	
7	7	
8	16	
9	9	
10	6	
11	20	
12	6	
13	EC 6	
Total	100	

Name _____

Circle Final Answers

1) (3 points) Solve for the variable: $x^4 + 34x^2 + 225 = 0$:

2) (2 points each) For the function $f(x) = 2x^2 + 6x - 5$, determine...

a) If it opens up or down. How do you know? b) The coordinates of the vertex:

c) The domain: d) The range: e) Interval of increase: f) Interval of decrease:

g) Based only on your answers to parts *a* and *b*, will it have *x*-intercepts? Why or why not?

3) (5 points) Combining his love of farm life and coffee, Mike opens up a new coffeehouse called *Joe Joe Bahhh*. Next to the coffeehouse, he wishes to build three adjacent rectangular pens that all use the coffeehouse as an edge. He has 150 feet of fencing available. Assuming the edge along the coffeehouse needs no fencing, what should the dimensions of the enclosure be to maximize the area and what is the maximum area?

4) (3 points each) Solve for the variable. Write part *b*'s answer in interval notation:

a) $x + \frac{12}{x-3} = 1 + \frac{4x}{x-3}$

b) $6|2x+1| - 7 = 10$

5) (2 points) Fill in the chart with a sketch of the location of the arrowheads:

	Even Degree	Odd Degree
Positive Leading Coefficient		
Negative Leading Coefficient		

6) (2 points each) Form a polynomial function of degree four that meets the following requirements. **Be sure to leave your answer in factored form:**

a) Has zeros at 5, -8 , 6 , and 12 :

b) Has the same zeros and multiplicity as in part *a* but is a different function:

c) Has zeros including $2 - 7i$ and $12 + \sqrt{3}$:

7) (3 points *a*; 2 points others) Consider the functions $f(x) = 2x^3 + x^2 - 7x - 26$ and $g(x) = x^2 + 3x + 4$.

a) Divide $f(x)$ by $g(x)$ using long division:

b) Based on your work in part *a*, was $g(x)$ a factor of $f(x)$? Why or why not?

c) What is the equation of the oblique asymptote of the rational function $y = \frac{2x^3 + x^2 - 7x - 26}{x^2 + 3x + 4}$?

8) (8 points each) Factor the polynomial completely by first listing the possible rational roots and then using synthetic division and your calculator.

a) $f(x) = 3x^3 + 16x^2 + 15x - 18$

b) $g(x) = x^5 - 6x^4 - 3x^3 + 42x^2 + 2x - 60$

9) (3 points each) Using your factorized result from 8a, complete the following for the function

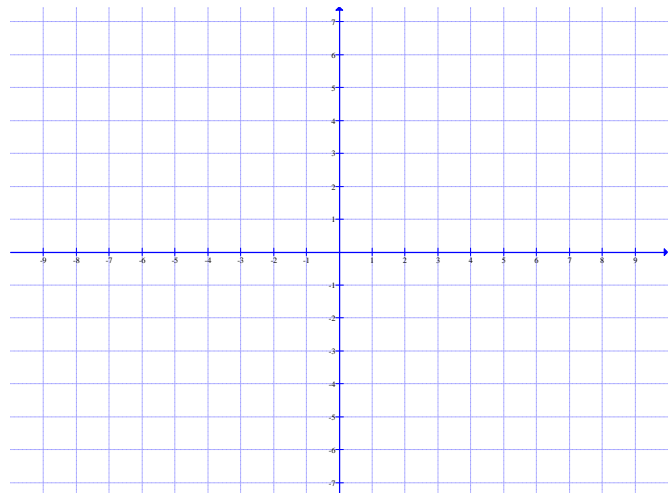
$f(x) = 3x^3 + 16x^2 + 15x - 18$:

a) What is the leading term and in which quadrants will the arrowheads end up?

c) Sketch the graph based on parts *a* and *b*:

b) Fill in the chart:

Zero	Multiplicity	Touch/Cross



10) (2 points each blank) Fill in the blank:

a) If c is a zero of a function f , then $f(c) =$ _____, and _____ is a factor.

b) Numbers not in the domain of a rational function lead to _____.

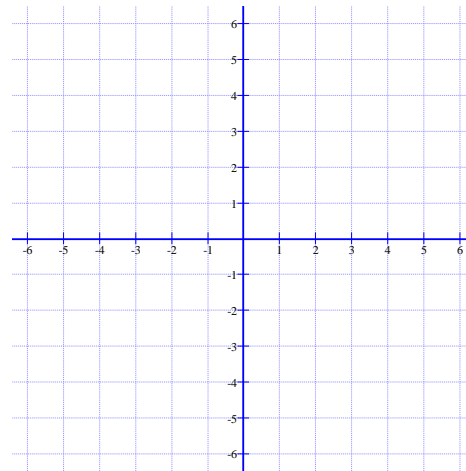
11) (4 points each) For the function $f(x) = \frac{2x+2}{x^2-1}$, find...

a) The domain: b) The intercepts (if any): c) Any vertical asymptotes and holes:

d) Any horizontal or oblique asymptotes:

e) Sketch a graph using the above information.

HINT: Consider transformations based on the simplified version of the function!



12) (3 points each) Solve for the variable. Write answer in interval notation:

a) $x^3 - x^2 - 6x \leq 0$

b) $\frac{x-3}{x+2} \geq 0$

13) Extra Credit: (3 points each) Short answer. Clearly explain how to find the following algebraically:

a) Vertical Asymptotes and Holes:

b) Horizontal and Oblique Asymptotes: