MATH 1530 Fall 2016
Exam 2

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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 6 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	2	
2	7	
3	4	
4	4	
5	2	
6	9	
7	6	
8	7	
9	14	
10	9	
11	20	
12	6	
13	6	
14	4	
Total	100	

Name _____

Circle Final Answers

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

2) (1 point each) For the function $f(x) = 2x^2 + 6x + 9$, 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) (4 points) A farmer has 500 feet of fence and wishes to enclose 4 adjacent rectangular pens that are all next to a river. The side against the river will not receive any fencing. Determine the dimensions of the enclosure to maximize its area. Let *x* represent the width of that enclosure. Also, what is the maximum area?

4) (2 points each) Solve for the variable. Write part *b* in interval notation:

a) $x + \frac{12}{x-3} = 1 + \frac{4x}{x-3}$ b) $6|2x+1| - 7 \leq 10$

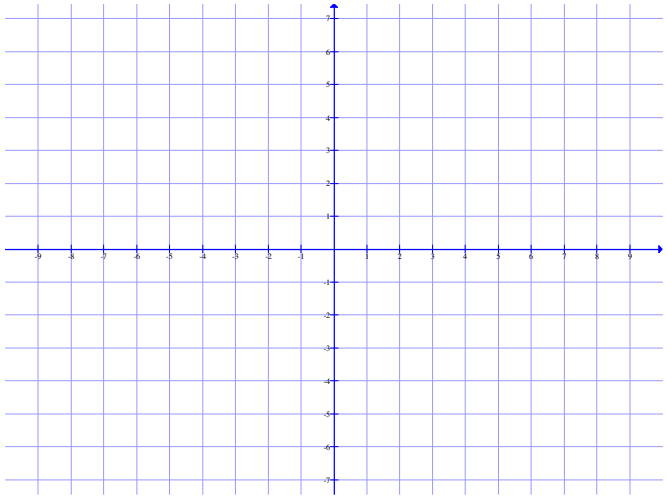
5) (2 points) Fill in the chart with a sketch of the location of the arrowheads:

	Even Degree	Odd Degree
Positive Leading Coefficient		
Negative Leading Coefficient		

6) (3 points each) For the function $f(x)=(x+3)^2(2x+1)^2(x-2)\ldots$

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

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



b) Fill in the chart:

Zero	Multiplicity	Touch/Cross

7) (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 $12+\sqrt{3}$:

8) (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 $y=\dfrac{2x^3+x^2-7x-26}{x^2+3x+4}$?

9) (7 points each) Factor the polynomial completely by first listing the possible rational roots and then using synthetic division and your calculator.

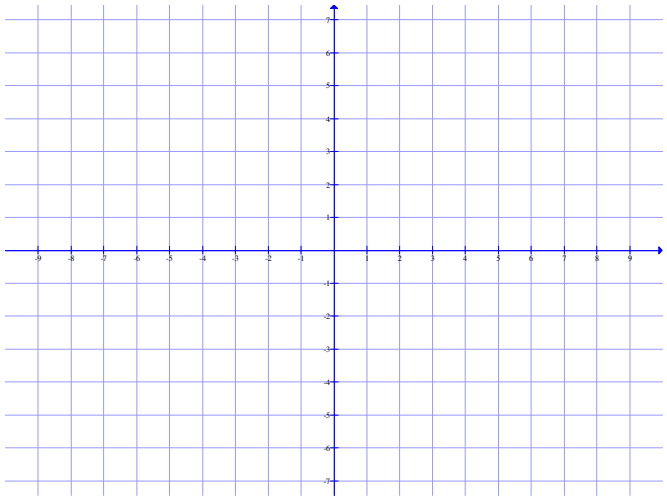
a) $f(x)=3x^3+16x^2+15x-18$

b) $g(x)=x^5-11x^4+49x^3-111x^2+128x-60$

10) (3 points each) Using your factorized result from 9a, complete the following for the function $f(x)=3x^3+16x^2+15x-18$:

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

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



b) Fill in the chart:

Zero	Multiplicity	Touch/Cross

11) (5 points each) For the function $f(x)=\dfrac{2x+2}{x^2-1}$, find…

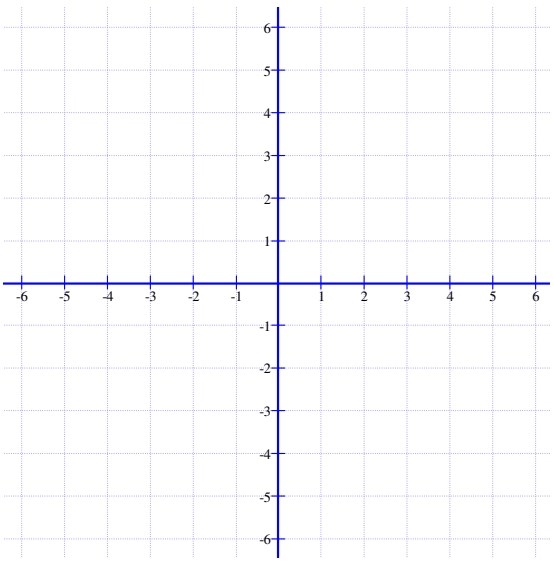
a) The domain:

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) (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 _____.

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

a) Vertical Asymptotes and Holes:

b) Horizontal and Oblique Asymptotes:

14) (2 points each) Solve for the variable. Write answer in interval notation:

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

b) $\dfrac{x-3}{(x-4)(x+2)} \geq 0$

Extra Credit (2 points) :

Find the equation of a rational function **in factored form** that has the following properties:

a) Hole at $x = 7$

b) Vertical Asymptotes at $x = -3$ and $x = -8$

c) x-intercepts at $x = \dfrac{8}{3}$ and $x = 2$

d) Horizontal asymptote at $y = 3$