MATH 1530 Fall 2019 Mike McCraith
Exam 2

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 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	12	
3	5	
4	4	
5	9	
6	9	
7	6	
8	7	
9	12	
10	16	
11	6	
12	6	
13	6	
Total	100	

Name _____

circle final answers

1) (2 points) Solve for the variable in $x^4 - 16 = 0$. Hint: There are four answers.

2) (2 points each) For the function $f(x) = -2x^2 - 8x + 3$, 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:

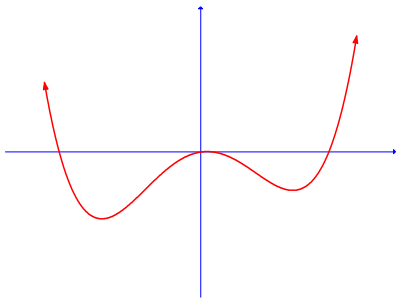
f) Interval of decrease:

3) (5 points) Dolores Umbridge is upset with the new crop of first-year students at Hogwarts. She decides to enclose them in an evil rectangular garden of doom near the Whomping Willow. She wants to create 3 adjacent pens that which are enclosed on all sides using 200 feet of fence. What should the dimensions of the enclosure be to maximize area? Also, what is the maximum area? Be sure to draw a picture for this scenario.

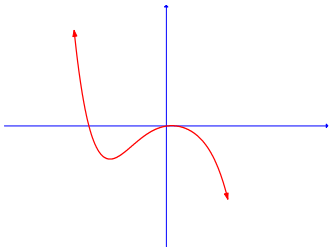
Ms. Umbridge sips her tea whilst gleefully judging her students.

4) (2 points each) Give an example of a function which will have similar arrowheads to the function below:

a)



b)



$f(x)=$_____ $f(x)=$_____

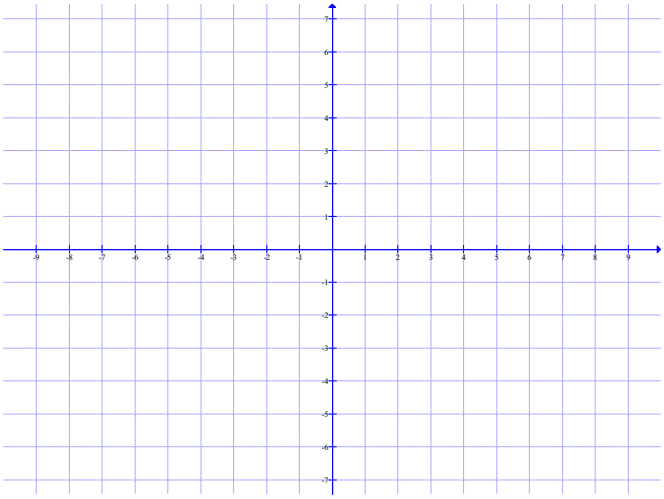
5) (3 points each) For the function $f(x)=(x+4)^2(2x+3)^2(x-3)\ldots$

a) Find the leading term and state which quadrants the arrowheads will be in and why:

b) Fill in the chart:

Zero	Multiplicity	Touch/Cross

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



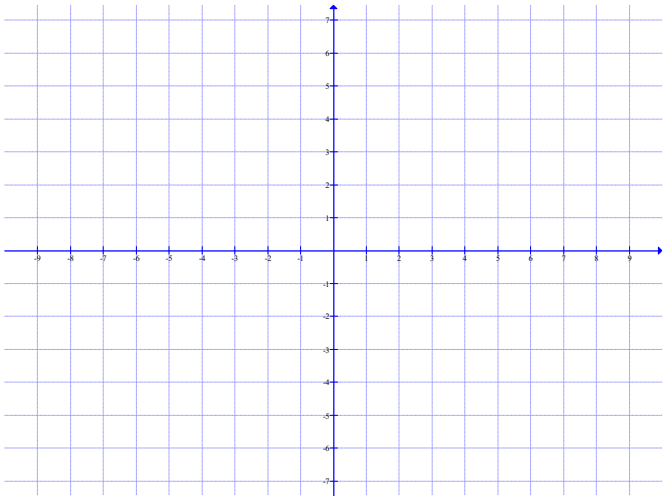
6) (3 points each) For the function $f(x)=-3x^4+12x^2\ldots$

a) Find the leading term and state which quadrants the arrowheads will be in and why:

b) Fill in the chart:

Zero	Multiplicity	Touch/Cross

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



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 8, 3, 5, and -2:

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

c) Has a zero at $5-7i$, and 8 is a zero of multiplicity 2:

8) (3 pts *a;* 2 pts others) Consider the functions $f(x)=6x^3+x^2-12x+5$ and $g(x)=3x^2+2x-5$.

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 $y=\dfrac{6x^3+x^2-12x+5}{3x^2+2x-5}$?

9) (6 points each) Factor the polynomial completely by first listing the possible rational roots and then using synthetic division and your calculator.

a) $f(x)=x^3-5x^2-12x+36$

b) $g(x)=x^4-2x^3-10x^2+16x+40$

10) (4 points each) For the function $f(x)=\dfrac{x^2+6x+9}{x^3+7x^2+12x}$, find…

a) The domain:

b) The *x*- and *y*-intercepts:

c) Any vertical asymptotes and holes:

d) Any horizontal or oblique asymptotes:

11) (2 points each) 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 _____.

12) (3 points each) Short answer. Clearly explain how to find the following algebraically:

a) Vertical Asymptotes and Holes:

b) Horizontal and Oblique Asymptotes:

13) (3 points each) Solve for the variable. Write answer in interval notation:

a) $x^3 - 5x^2 + 6x \leq 0$

b) $\dfrac{x^2 + 6x + 5}{x - 4} \geq 0$

Extra Credit (2 points) :

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

a) Hole at $x = 9$

b) Vertical Asymptotes at $x = -3$ and $x = 5$

c) x-intercepts at $x = \dfrac{1}{7}$ and $x = -6$

d) Horizontal asymptote at $y = 7$