

READ THESE DIRECTIONS BEFORE STARTING

- ❖ 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 the impression that you are cheating.
- ❖ Be sure to write neatly and in pencil. If I cannot read what was written, do not expect the problem to be graded.
- ❖ If you finish early, go over the test again.

Good luck!

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

Name _____

Circle final answers

1) (3 points) Solve for the variable in $x^4 - x^2 - 2 = 0$ by rewriting the equation as a quadratic.

2) (2 points each) For the function $f(x) = 4x^2 - 12x + 1$, determine...

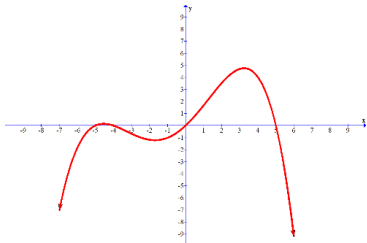
a) If it opens up or down. How do you know? b) The coordinates of the vertex (by hand)

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

3) (6 points) Forza is building some gardens on his lovely island of Pixel Cove. He wants to build 3 adjacent rectangular pens which will border a river to showcase his prize flowers. The side against the river will not receive any fencing. He has 192 feet of fencing available. What should the dimensions be of the enclosure to maximize the area? What is the maximum area?

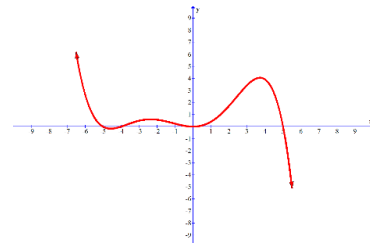
4) (2 points each) Give an example of a function which will have similar arrowheads to the function below:

a)



$f(x) =$ _____

b)



$f(x) =$ _____

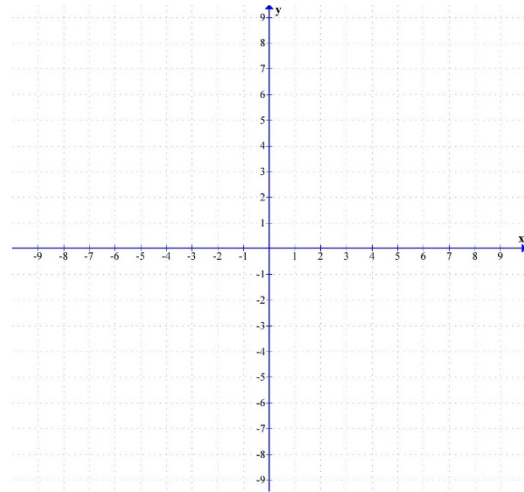
5) (4 points each) For the function $f(x) = (x+4)^2(2x+1)^2(x-3)\dots$

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

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

b) Fill in the chart:

Zero	Multiplicity	Touch/Cross



6) (3 points each) Form a polynomial function of degree five that meets the following requirements. **Be sure to leave your answer in factored form.**

a) Has zeros including -3 , $6 + 5i$, and 4 is a zero of multiplicity 2

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

7) (4 points part a, 2 points each b and c) Consider the functions $f(x) = x^3 + 4x^2 - 7x - 10$ and $g(x) = x^2 - x - 2$.

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?

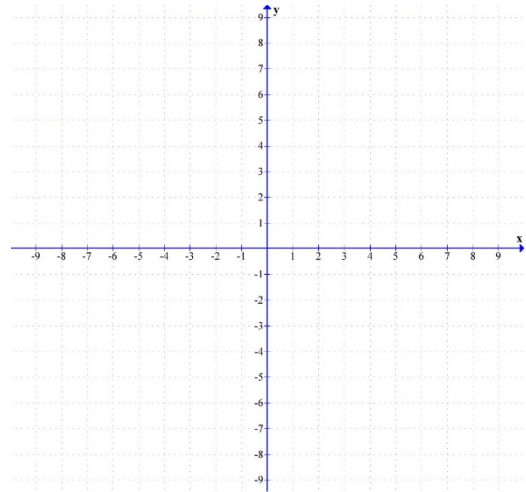
c) What is the equation of the oblique asymptote of the rational function $y = \frac{x^3 + 4x^2 - 7x - 10}{x^2 - x - 2}$?

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

$$f(x) = x^4 - 6x^3 + 10x^2 + 2x - 15$$

9) (3 points each) Continuing from number 8, for the function $f(x) = x^4 - 6x^3 + 10x^2 + 2x - 15$, based on your work in number 8, complete the chart and sketch the graph.

Zero	Multiplicity	Touch/Cross



10) (4 points each) For the function $f(x) = \frac{x^2 - 3x + 2}{x^3 - x^2 - 2x}$, find...

a) The domain

b) The x - and y -intercepts. Label your answers.

c) Any vertical asymptotes and holes

d) Any horizontal or oblique asymptotes

