

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.
- ❖ If you finish early, go over the test again.

Good luck!

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

Name _____

CIRCLE FINAL ANSWERS

1) (2 points each) For the following functions, determine the domain. Write the domain for part c in interval notation:

a) $f(x) = 7x^3 + 8x^2 - 5x + 1$

b) $g(x) = \frac{x^2 + 10x + 25}{x^2 - 5x - 6}$

c) $h(x) = \sqrt{7x - 61}$

2) (3 points) For the function $f(x) = 3x^2 + 6x + 5$, find and simplify $\frac{f(x+h) - f(x)}{h}$

3) (2 points each) Consider the piecewise-defined function below. The function f represents the cost of sending a package in dollars and x is the number of miles the package needs to travel.

Find and interpret:

a) $f(50)$

$$f(x) = \begin{cases} 0.79x + 5.75 & 0 < x \leq 50 \\ 0.98x + 2.18 & 50 < x \leq 200 \\ 1.13x - 26 & x > 200 \end{cases}$$

b) $f(380)$

4) (2 points each) Short answer: In your own words, describe the formula for...

a) Cost

b) Revenue

c) Profit

5) (2 points each) How do you find...

- a) The number of units necessary to break even? b) Where the equilibrium point is?

6) A recording studio plans to sell the new album *You Warm Me Like A Brick Oven* by P. Doughboy for \$12.14 each. It costs \$4.95 to burn each CD. Also, the recording studio had to pay \$2,962.28 to cover licensing and fees.

- a) (4 points) Write and label the corresponding Revenue, Cost, and Profit functions: b) (3 points) How many CDs must be sold to break even?

7) (2 points each) Suppose that the price and demand for a Mintendo 4DS was given by $p = D(q) = 220 - 2.6q$ and the price and supply was given by $p = S(q) = 2.4q$ where p is price in dollars and q is the demand in units of the Mintendo 4DS.

a) Find and interpret, using the language of the problem, the following:

- i) $D(50)$ ii) $S(50)$

b) Find the demand when the price is \$60:

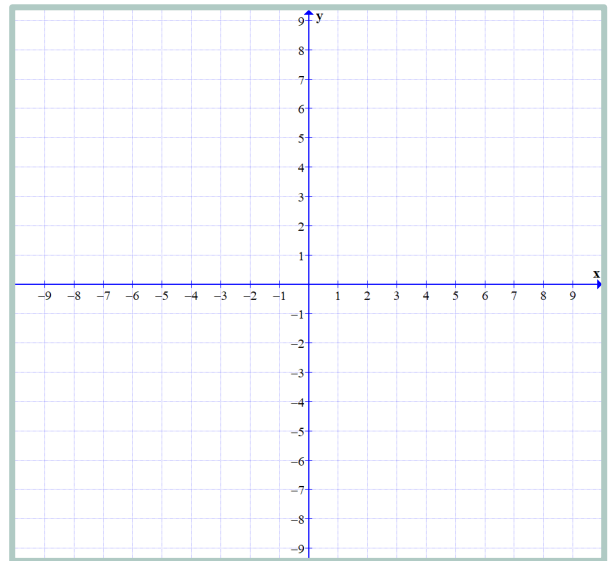
c) Find the supply when the price is \$60:

- d) Based on your answers for parts *b* and *c*, will there be a shortage or surplus when the price is \$60? How do you know? e) Find the equilibrium quantity and equilibrium price:

8) (3 points each) For the function $f(x) = -(x-2)^2 + 4 \dots$

a) Explain, in order, the steps needed to sketch the graph:

b) Sketch and label the graph:



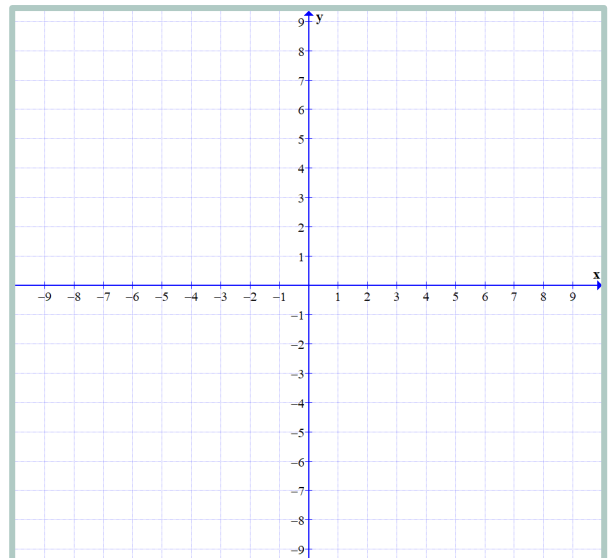
9) (3 points each) For the quadratic function $f(x) = x^2 + 2x - 8$, find...

a) The vertex:

b) The x -intercepts:

c) The y -intercept:

d) Sketch the graph using the above:



10) (3 points each) Jo Jo Ba decided to drop the javelin and start launching last year's Easter baskets. Throwing the baskets from a 75 foot cliff, the height of a basket h , in feet, can be given by the function $h(t) = -16t^2 + 40t + 75$ where t is time in seconds. Determine the following:

- a) At what time is the basket the highest off of the ground? b) What is the highest height the basket reaches?

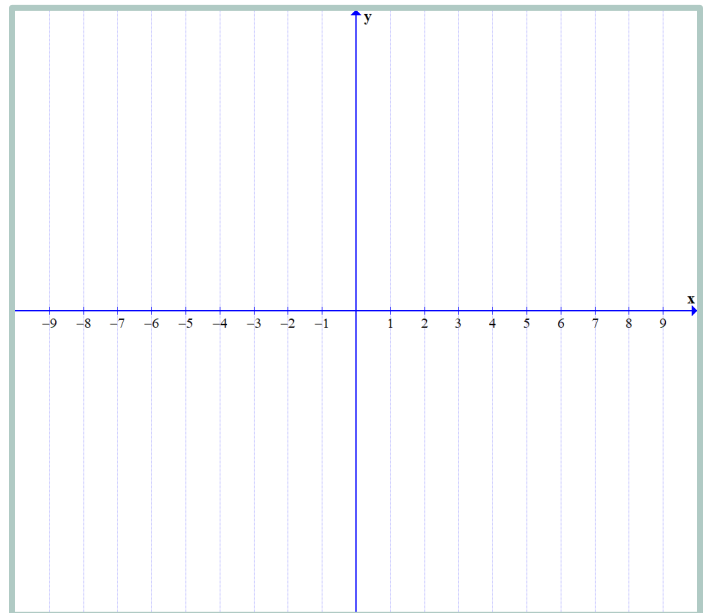
c) When does the basket hit the ground?

11) (3 points each) For the function $f(x) = (x-4)^2(2x+1)^2(x+3)\dots$

- 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:

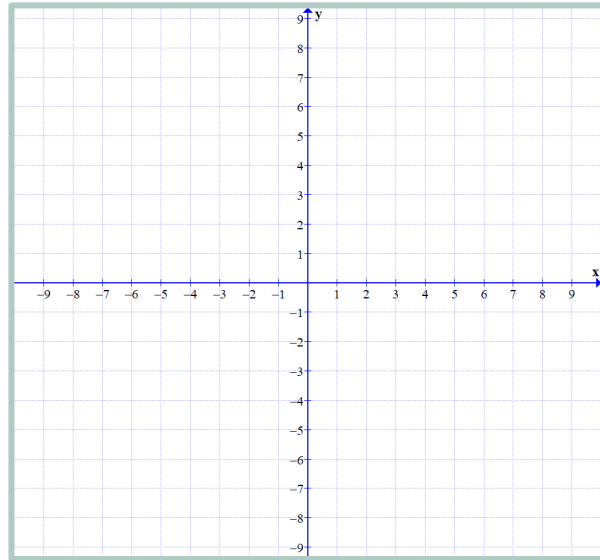
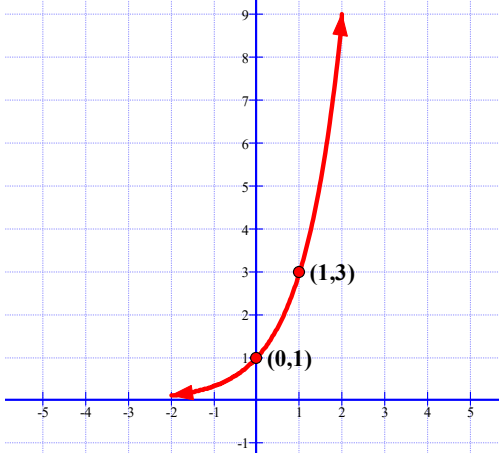
Zero	Multiplicity	Touch/Cross



12) (3 points each) For the rational function $f(x) = \frac{-4x^2 + 3}{x^2 + 14x + 48}$, find...

- a) Any Vertical Asymptotes: b) Any Horizontal Asymptotes:

13) (4 points) Graph $g(x) = 3 \cdot 3^{x+3} - 6$ by transforming the given function $y = 3^x$. Be sure to move and label the given points and asymptotes.



14) (3 points each) Upon its release in early 2017, the Nintendo Switch is selling fast. Below, you can see some of the total worldwide sales (in millions).

Month, Year	March 2017	June 2017	December 2017	March 2018	December 2018	December 2019
Number sold (in millions)	2.74	4.70	14.86	17.79	32.27	52.48

Let x be the number of months since **December, 2016** and let y be the worldwide sales in millions. Round answers to three places.

a) Using your calculator, determine an exponential regression model of the form $f(x) = a \cdot b^x$ that models this data.

b) Find and interpret $f(13)$.

c) Find and interpret $\frac{f(13)}{13}$.

d) Using the model, how many units sold in December, 2019 alone?