2 points each) Find the domain of the following functions:

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

$\mathbb{R}$

b) $g(x)=\dfrac{7-5x}{x^2+6x-16}$

$x^2+6x-16=0$

$(x+8)(x-2)=0$

$\boxed{x\neq -8, 2}$

2) (6 points) For the function $f(x)=x^2+10x+4$, find and simplify $\dfrac{f(x+h)-f(x)}{h}$:

$$\frac{(x+h)^2+10(x+h)+4-(x^2+10x+4)}{h} = \frac{x^2+2xh+h^2+10x+10h+4-x^2-10x-4}{h}$$

$$= \frac{2xh+h^2+10h}{h} = \frac{h(2x+h+10)}{h} = \boxed{2x+h+10}$$

3) (3 points each) For the piecewise-defined function $f(x)=\begin{cases}2x+1 & x\leq -1\\ -3x+5 & x\geq 3\end{cases}$

a) Evaluate the function:

i) $f(-10)$ $=2(-10)+1$

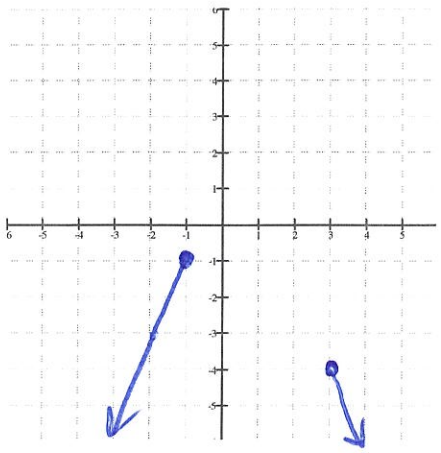
$=-19$

ii) $f(0)$ undefined!

iii) $f(3)$ $=-3(3)+5$

$=-4$

b) Sketch a graph:



4) (1 points each) Short answer: In your own words, describe the formula for the…

a) Cost Function:

b) Revenue Function:

c) Profit Function:

words

5) (1 point each) Explain the following terms:

a) Break even

b) Equilibrium quantity and value

Go here

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6) (4 points each) With the announcement of the new Pixel phone, CwazyCases will start making custom cases for the phone and will sell them for \$66.50 each. The cost to build each case is \$24.50 and there is an additional cost of \$2100 for tools and various supplies. Let x represent the number of cases made and sold.

a) Write and label the corresponding Revenue, Cost, and Profit functions for this problem:

$R(x) = 66.50x$

$C(x) = 24.50x + 2100$

$P(x) = 66.50x - (24.50x + 2100) = 42x - 2100$

b) When only 40 cases are sold, is there a profit or a loss? Show your work to support your answer.

$P(40) = -420$

loss of \$420

c) How many cases must be sold to break even?

$R(x) = C(x)$

$66.50x = 24.50x + 2100$

$42x = 2100$

$x = 50$ cases

7) (4 points each) It was found that the price and demand for a Cactar plushie can be given by $p = D(q) = 132 - 1.75q$ where p is price in dollars and q is the demand in hundreds of plushies.

Suppose that the price and supply (in hundreds of plushies) is given by $p = S(q) = 1.25q$.

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

i) $D(60) = 132 - 1.75(60)$

$p = 27$

If the price is \$27, 6000 plushies are demanded.

ii) $S(26) = 1.25(26) = 32.5 = p$

If the price is \$32.50, 2600 plushies are supplied.

b) Find and interpret the intercepts of the Demand function:

$q = 0 \Rightarrow p = 132 - 1.75(0) = 132$

$p = 0 \Rightarrow 0 = 132 - 1.75q \Rightarrow q = 75$

Zero are demanded when the price is \$132.

7500 are demanded when the price is \$0.

c) Find and interpret the intercept of the Supply function:

$q = 0 \Rightarrow p = 0$

No plushies are supplied when the price is \$0.

d) Find the equilibrium quantity and equilibrium price:

$D(q) = S(q)$

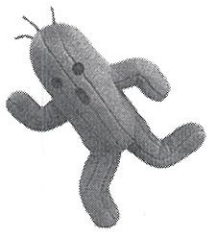
$132 - 1.75q = 1.25q$

$132 = 3q$

$q = 44$

$S(44) = 1.25(44)$

$p = 55$



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8) (3 points each) Jo Jo Ba decided to drop the javelin and start launching Easter baskets that she found on her neighbors' yard. Throwing the baskets from a 50-foot cliff, the height of the basket, h, in feet, can be given by the function $h(t) = -16t^2 + 73.6t + 50$ where t is time in seconds. Determine the following, rounding to two places as needed.

a) At what time is the Easter basket the highest off of the ground?

$t = \frac{-b}{2a} = \frac{-73.6}{2(-16)} = 2.3$ sec

b) What is the highest height the basket reaches?

$h(2.3) = 134.64$ ft

c) When does the basket hit the ground?

$-16t^2 + 73.6t + 50 = 0$

$t = \frac{-73.6 \pm \sqrt{73.6^2 - 4(-16)(50)}}{2(-16)}$

$t = 5.2$ or ~~$t = -0.6$~~

d) What is the domain of this function?
Hint: Remember that t represents time.

[0, 5.2]

9) (3 points each) For the function $f(x) = -2(x+1)^2 + 3$…

a) List the transformations needed to sketch a graph:

Step 1: left 1

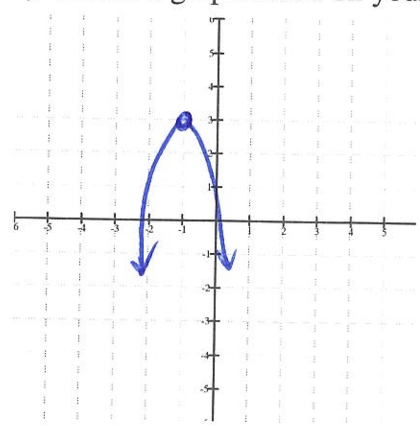
Step 2: multiply y-coor by -2

Step 3: up 3

either order (Steps 1 and 2)

mult before last (Step 3)

b) Sketch a graph based on your steps:



10) (4 points each) For the function $f(x) = (x+2)^3(x-4)^2$

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

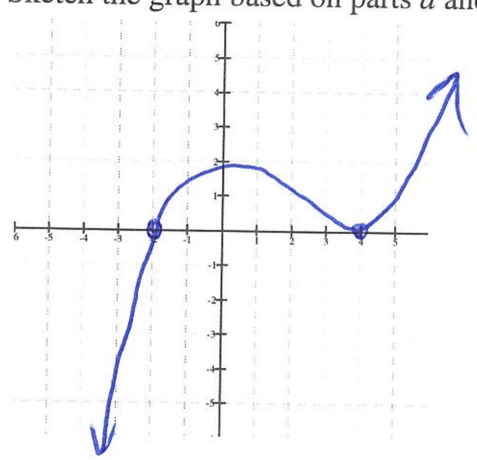
x^5 — 5 → odd, positive

QI & III

b) Fill in the chart:

Zero	Multiplicity	Touch/Cross
-2	3	→ odd → cross
4	2	→ even → touch

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



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11) (2 points each) For the rational function $f(x) = \frac{x^2+6x}{x^2+6x+5}$, determine the location of the following:

a) The vertical asymptote(s):

$x^2+6x+5=0$

$(x+5)(x+1)=0$

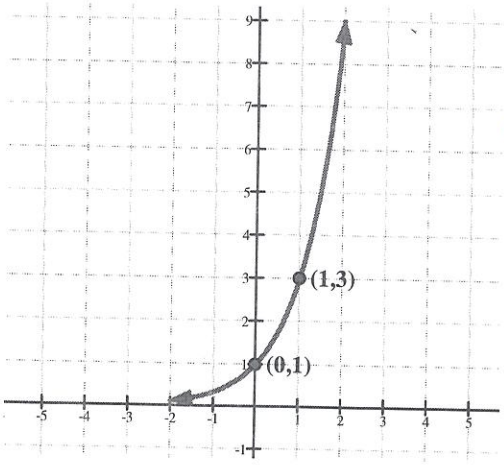
$x=-5 \quad x=-1$ VA

b) The horizontal asymptote:

$y=1$

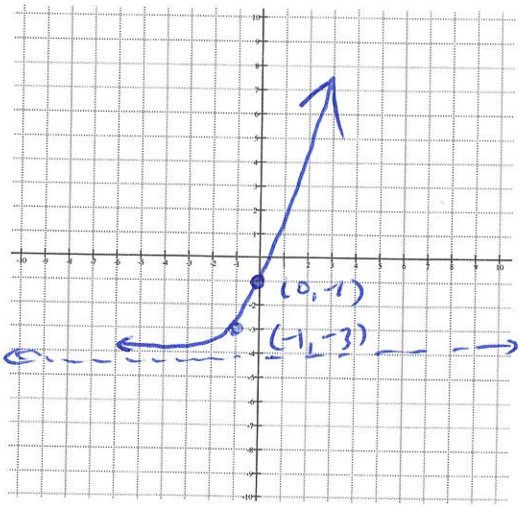
$\frac{1/x^2}{1x^2 \to \infty}$ ratio

12) (4 points) ~~Graph~~ $g(x) = 3^{x+1} - 4$ by transforming the given function $y = 3^x$. Be sure to move and label the given points and asymptotes.



left 1

down 4



13) (3 points each) The number of irate Dutch people in the Netherlands was growing exponentially after someone ate a stroopwafel without properly heating it. The number of irate Dutch people can be modeled by the function $d(x) = 2.14e^{0.44x}$ where x is the number of days after the stroopwafel was improperly ingested and d is the number of irate Dutch people **in thousands**. Round to the nearest whole number as needed.

a) Approximately how many Dutch people were upset after the first week?

$d(7) \approx 46{,}563$

$2.14e^{0.44(7)}$

b) How many became irate on the 9th day?

$D(9) - D(8) = 39{,}960$

Dutch people

c) Using the INTERSECT command on your calculator, during which day will there be 12,000 irate Dutch people?

$y=12$

$x = 3.9 \rightarrow$ During Day 4