1) (2 points each) Short answer:

a) What makes a relation a function?

b) So far in this class, we've discussed two things you cannot do with real numbers? What are they?

words

more words

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

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

$\mathbb{R}$

b) $g(x)=\dfrac{2x+3}{2x^2-18}$

$2x^2-18=0$

$x^2=9$

$x\neq\pm3$

3) (4 points) For the function $f(x)=2x^2-6x+5$, find and simplify $\dfrac{f(x+h)-f(x)}{h}$:

$$=\frac{2(x+h)^2-6(x+h)+5-(2x^2-6x+5)}{h}$$

$$=\frac{2x^2+4xh+2h^2-6x-6h+5-2x^2+6x-5}{h}$$

$$=\frac{4xh+2h^2-6h}{h}$$

$$=4x+2h-6$$

4) (3 points each) Mary buys a Cricut cutting machine and other supplies for \$657 and plans to make custom aprons to sell with the machine. Each apron costs \$12.50 to make and she plans to sell them for \$30.75 each.

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

$R(x)=30.75x$

$C(x)=12.50x+657$

$P(x)=30.75x-(12.50x+657)$

$=18.25x-657$

b) How many aprons must be sold to break even?

$30.75x=12.50x+657$

$18.25x=657$

$x=36$ Aprons

c) If she sells 5 aprons a week, **during** which week will she be able to break even?

$\frac{36}{5}=7.2$

during the 8th week.

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5) (3 points each) It was found that the price and demand for *A Taco's Adventure Deluxe Edition* video game can be given by $p = D(q) = 663 - 0.55q$ where p is price in dollars and q is the demand in hundreds of copies of the game. Suppose that the price and supply (in hundreds of copies of the game) is given by $p = S(q) = 2.05q$. Rounding answer to the nearest whole number as needed…

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

i) $D(200)$ $= 663 - 0.55(200)$

$= 553$

20,000 games are demanded when the price is $553.

ii) $S(400)$ $= 2.05(400) = 820$

40,000 games are supplied when the price is $820.

b) Find the demand when the price is \$300:

$300 = 663 - 0.55q$

$-363 = -0.55q$

$q = 660$

c) Find the supply when the price is \$300:

$300 = 2.05q$

$q = 146$

d) Based on your work in parts *b* and *c* above, will there be a surplus or shortage when the price is \$300? Explain your answer.

shortage

demand > supply

e) Find the equilibrium quantity and equilibrium price:

$663 - 0.55q = 2.05q$

$663 = 2.6q$

$q = 255$

$p = S(255) = \$522.75$

6) (1 points each) Short answer: In your own words, describe the formula for the…

a) Cost Function: b) Revenue Function: c) Profit Function:

fun w/ words

7) (3 points each) Jo Jo Ba decided to drop the javelin and start launching pumpkins that she found on her neighbors' front porch. Throwing the pumpkins from a 50-foot cliff, the height of the pumpkin h, in feet, can be given by the function $h(t) = -16t^2 + 57.6t + 50$ where t is time in seconds. Determine the following:

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

$t = \frac{-57.6}{2(-16)} = 1.8$ sec

b) What is the highest height the pumpkin reaches?

$h(1.8) = 101.84$ ft

c) When does the pumpkin hit the ground?

$t = \frac{-57.6 \pm \sqrt{57.6^2 - 4(-16)(50)}}{2(-16)} =$

~~$t = -0.72$~~ ✗

$t = 4.32$ sec ✓

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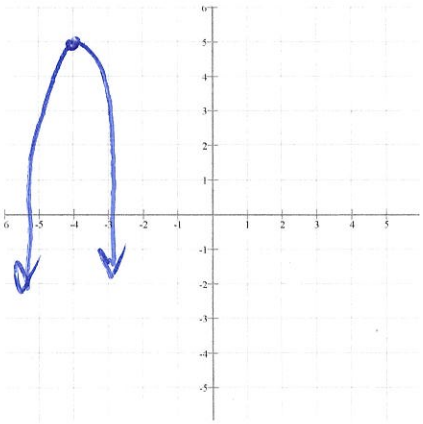
8) (3 points each) For the function $f(x)=-2(x+4)^2+5\ldots$

a) List the steps needed to sketch a graph:

1. Left 4
2. multiply y-coor by −2
3. up 5

b) Sketch a graph. ~~Be sure to label the asymptotes.~~



9) (3 points each) For the function $f(x)=2x^2-9x-5$, determine the following:

a) The domain

$\mathbb{R}$

b) Whether it opens up or down

up, $a=2>0$

c) The vertex

$x=-\frac{(-9)}{2(2)}=\frac{9}{4}$ -15.125

$f\left(\frac{9}{4}\right)=-\frac{121}{8}$

$\left(\frac{9}{4},-\frac{121}{8}\right)$

d) The range

$\left[-\frac{121}{8},\infty\right)$

e) The x-intercept(s)

$2x^2-9x-5=0$

$(2x+1)(x-5)=0$

$x=-\frac{1}{2}$ $\left(-\frac{1}{2},0\right)$

$x=5$ $(5,0)$

f) The y-intercept

$f(0)=-5$

$(0,-5)$

10) (3 points each) For the function $f(x)=-3x^4+12x^2\ldots$ $=-3x^2(x^2-4)=-3x^2(x+2)(x-2)$

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

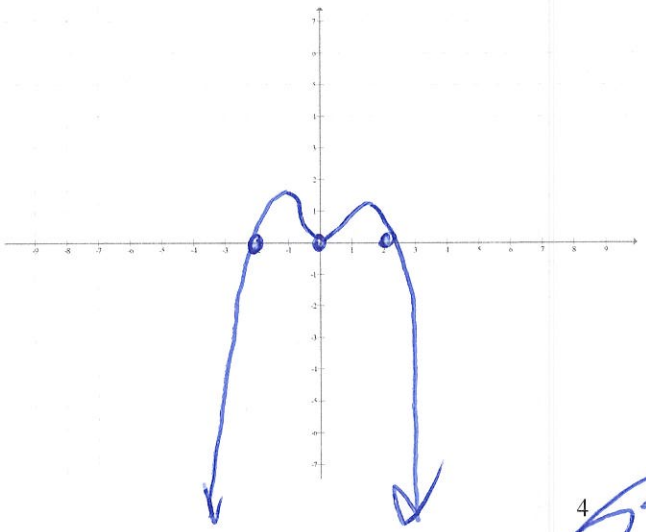
$-3x^4$ → even

negative → Q III & IV

b) Fill in the chart:

Zero	Multiplicity	Touch/Cross
−2	1	cross
0	2	touch
2	1	cross

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



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11) (2 points each) For the rational function $g(x)=\dfrac{2x+3}{2x^2-18}$, determine the location of the following:

a) The Vertical Asymptote(s)

$2x^2-18=0$

$x^2=9$

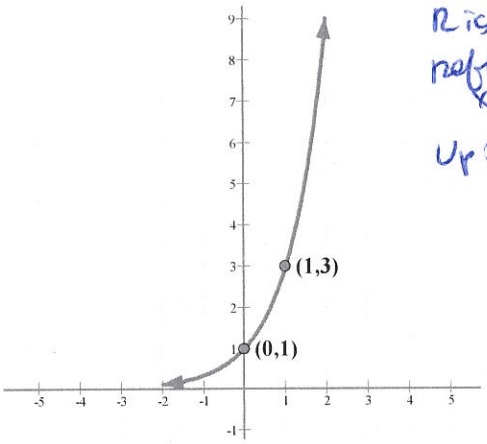
$x=3$

$x=-3$

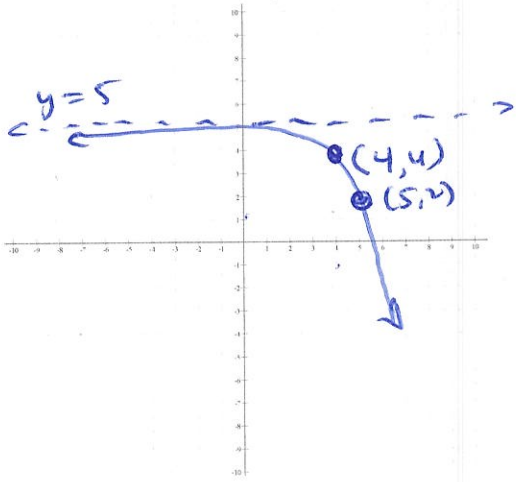
b) The Horizontal Asymptote

$y=0$

12) (3 points) Graph $g(x)=-3^{x-4}+5$ by transforming the given function $y=3^x$. Be sure to move and label the given points and asymptotes.



Right 4
reflect over x-axis
Up 5



13) (3 points each) At a certain bank, \$10,000 was deposited and 12 years later, there was \$12,800 in the account. Assuming the account grew exponentially and using the formula $f(t)=y_0b^t$, find the following:

a) Determine an exponential function that models the growth of the account:

$12800=10000b^{12}$

$1.28=b^{12}$

$b=\sqrt[12]{1.28}=1.02$

$f(t)=10000(1.02)^t$

b) Determine how much will be in the account after 20 years:

$f(20)=\$14,859.47$

c) How much did the account grow by during the 20th year?

$f(20)-f(19)=\$291.36$

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