Chapter 1 Test Review

1. Determine the domain of the following functions:

a. $f(x) = \sqrt{x + 7}$

D: $[-7, \infty)$
R: $[0, \infty)$

$x + 7 = 0$
$x = -7$

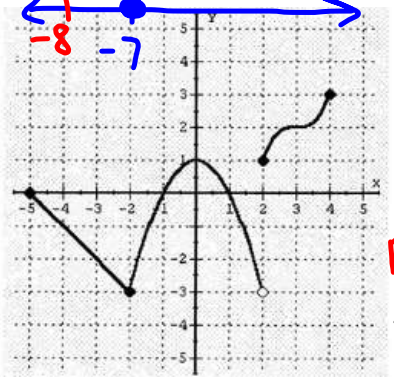
b. $f(x) = \frac{6}{x - 2}$

D: $(-\infty, 2) \cup (2, \infty)$
R: $(-\infty, 0) \cup (0, \infty)$

* horiz. asymp @ $y = 0$

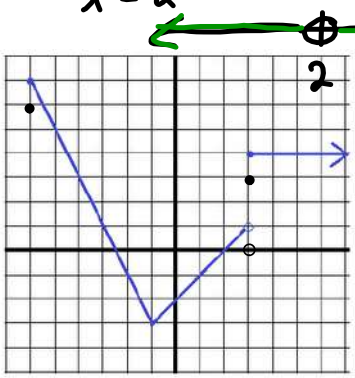
$x - 2 = 0$
$x = 2$

c.



D: $[-5, 4]$
R: $[-3, 3]$

d.



D: $[-6, \infty)$
R: $[-3, 7]$

2. Find all vertical and horizontal asymptotes of the graph of...

$f(x) = \frac{4x - 1}{5 - 2x}$

✓ highest degreed exponent in num/den if same ÷ coefficients

H $\frac{4x}{-2x}$

$y = -2$

✓ $5 - 2x = 0$
$5 = 2x$
$\frac{5}{2} = x$

★ $f(x) = \frac{3x + 1}{3x^2 + x}$

$3x^2 + x = 0$
$x(3x + 1) = 0$

$x = 0$

$y = 0$

$\frac{3x + 1}{x(3x + 1)}$ REMOVABLE DISCON. Hole in graph

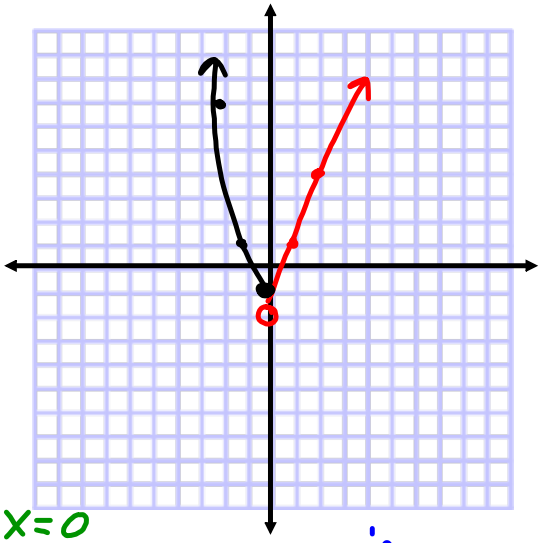
$\frac{3x^1}{3x^2} = \frac{x}{x^2} = \frac{1}{x}$

$\lim_{x \to \infty} f(x) = 0$

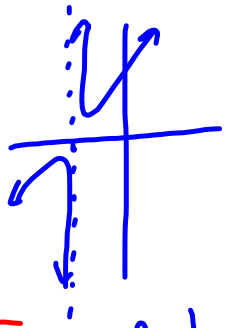
3. a. Graph the piecewise function...show coordinates

$$f(x)=\begin{cases}3x-2 & x>0\\ 2x^2-1 & x\le 0\end{cases}$$

x	y
-2	7
-1	1
0	-2
1	-1
2	1
	4



b. Is the function discontinuous? YES
If so, state the point of discontinuity x=0
and what type of discontinuity is occurring. JUMP



4. Solve the equation algebraically: $2x^2 - 7x - 4 = 0$

Factor or Quadratic

$(2x+1)(x-4)=0$

$2x+1=0$ $\quad 2x=-1$ $\quad x=-\frac{1}{2}$

$x-4=0$ $\quad x=4$

1 4 2 2

	x	-4
2x	$2x^2$	-8x
1	x	-4

$(2)(4)=8$ → 1 -8 2 4

$(x-4)(2x+1)$

$\frac{-(-7)\pm\sqrt{(-7)^2-4(2)(-4)}}{2(2)}$ infinite descent.

$\frac{7\pm\sqrt{49+32}}{4}$ $\quad \frac{7\pm\sqrt{81}}{4}$ $\quad \frac{7\pm 9}{4}$

$\frac{7+9}{4}$ $\quad \frac{7-9}{4}$

$\frac{16}{4}$ $\quad \frac{-2}{4}$

4 $\quad -\frac{1}{2}$

5. Solve the equation algebraically: $\sqrt{x+3} = x-3$

* Square both sides $(\sqrt{x+3})^2 = (x-3)^2$

FOIL $x+3 = (x-3)(x-3)$

$x+3 = x^2-3x-3x+9$

$x+3 = x^2-6x+9$

$-x-3 \quad -x-3$

$0 = x^2-7x+6$

$(x-6)(x-1)$

$x=6$ $x=1$ Extraneous

✓ Answers

Extraneous

6. Let $f(x) = 4x-7$ and $g(x) = \sqrt{x+1}$ and $h(x) = \frac{4}{x}$

a. find $g \circ f(x)$ and state the domain

$g \circ f(x) = \sqrt{4x-7+1} = \sqrt{4x-6}$

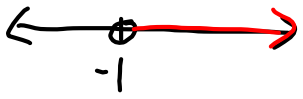
$4x-6 \geq 0$ D: $[\frac{3}{2}, \infty)$

$4x \geq 6$

$x \geq \frac{6}{4} = \frac{3}{2} = 1.5$

b. find $h \circ g(x)$ and state the domain

$\frac{4}{x}$ $\sqrt{x+1}$



$\frac{4}{\sqrt{x+1}}$ D

$x+1 > 0$ D: $(-1, \infty)$

$x > -1$

c. find $(f+g)(x)$ and state the domain

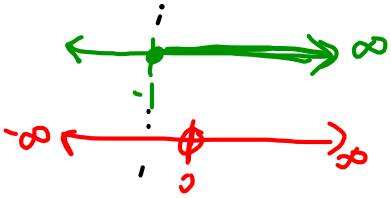
$4x-7+\sqrt{x+1}$ D: $[-1, \infty)$

d. find $(h+g)(x)$ and state the domain

$\frac{4}{x}+\sqrt{x+1}$, D: $[-1,0) \cup (0,\infty)$

$(-\infty,0) \cup (0,\infty)$ $[-1,\infty)$

D D



7. Determine whether the function is even, odd or neither

a. $g(x) = 3x^4 - 2x^2 - 5$

$g(-x) = 3(-x)^4 - 2(-x)^2 - 5$

$= 3x^4 - 2x^2 - 5$

EVEN

b. $j(x) = 2x^3 + 5x - 7$

NEITHER

$j(-x) = 2(-x)^3 + 5(-x) - 7$

$= -2x^3 - 5x - 7$

EVEN $f(-x) = f(x)$

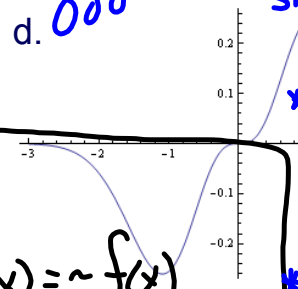
reflects y-axis

c. $k(x) = \frac{5}{x^2 + 2}$ EVEN

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

* put (-x) in for all x then simplify

d. ODD



ODD

$f(-x) = -f(x)$

origin symmetry

* if you get original function its even

* if all signs change its odd

8. Describe how the graph of $y = -3\left|\frac{1}{4}(x + 1)\right| + 7$ can be obtained from the graph of $y = |x|$

reflect x

Vertical stretch 3

horizontal stretch 4

1 left

7 up

9. From the list of 12 basic functions...

a. list 3 that are odd functions.

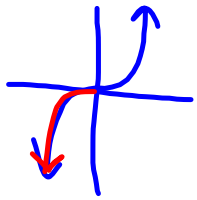
$y = \frac{1}{x}$ $y = x^3$ $y = x$ $y = \sin x$

b. list 3 that have asymptotes.

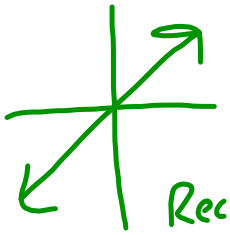
$y = \frac{1}{x}$ $y = e^x$ $y = \ln x$ $y = \frac{1}{1+e^{-x}}$

c. list 5 that have domain of all reals.

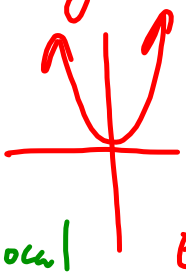
CUBIC $y = x^3$ $\mathbb{R}$



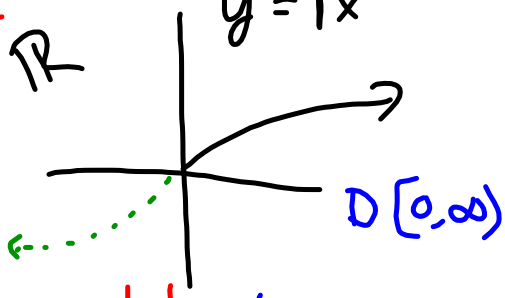
IDENTITY $y = x$ $\mathbb{R}$



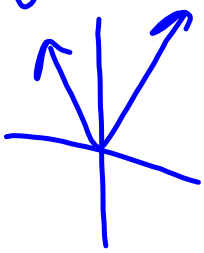
SQUARE $y = x^2$ $\mathbb{R}$



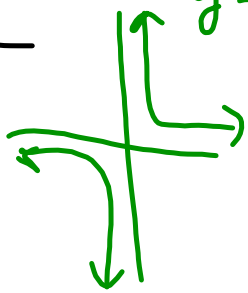
SQUARE ROOT $y = \sqrt{x}$ $D\ [0,\infty)$



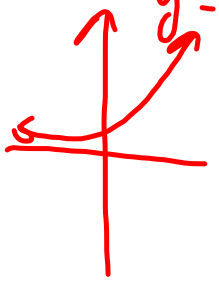
Absolute Value $y = |x|$ $\mathbb{R}$



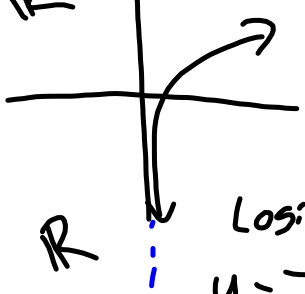
Reciprocal $y = \frac{1}{x}$



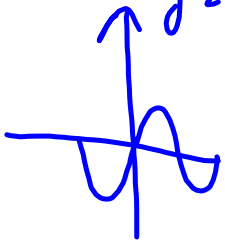
Exponential $y = e^x$



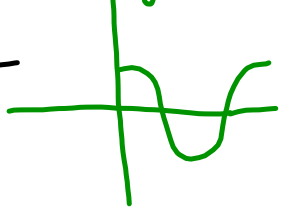
$y = \ln x$ $\mathbb{R}$



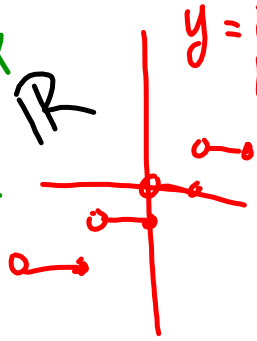
$y = \sin x$ $\mathbb{R}$



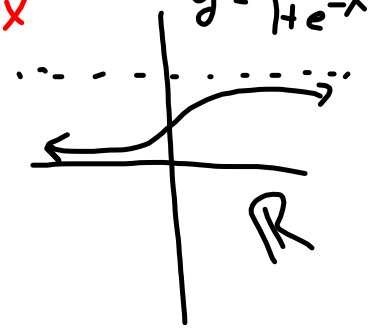
$y = \cos x$ $\mathbb{R}$



$y = \text{int } x$ $[x]$ $\mathbb{R}$



Logistic $y = \frac{1}{1+e^{-x}}$ $\mathbb{R}$



Cubing odd

Integer

Cosine

Sine

Square Root

Squaring

Identity

Reciprocal

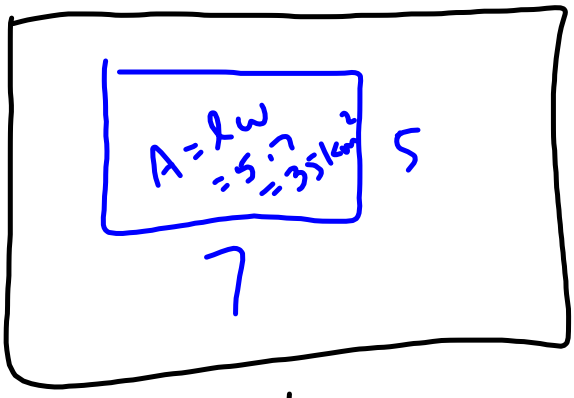
Logarithmic

Logistic

Absolute Value

Exponential

10. A satellite camera takes a rectangular shaped picture. The smallest region that can be photographed is a 5 km x 7 km rectangle. As the camera zooms out, the length l and width w of the rectangle increase at a rate of 3 km/sec. How long does it take for the area A to be at least 7 times it's original size?



$A = 35\ km^2$

$\times\ 7$

$245\ km^2$

$245 = (5+3t)(7+3t)$

$245 = 35 + 15t + 21t + 9t^2$

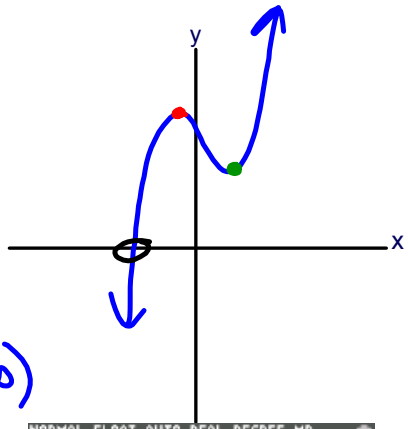
$245 = 35 + 36t + 9t^2$

$0 = -210 + 36t + 9t^2$

$t = 3.23\ s$

11. The chemistry lab at the BGSU keeps two acid solutions on hand. One is 20% acid and the other is 35% acid. How much of each type of solution should be used to prepare 25 L of a 26% acid solution?

12. Use a graphing calculator to sketch the graph $f(x) = x^3 - x^2 - 2x + 4$



x's a. Find the zeros of the function

$x = -1.66$

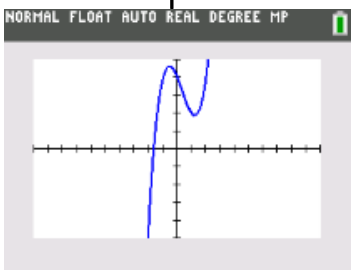
y's b. Find all local maxima and minima

max 4.63 @ x = -.55

min 1.89 @ x = 1.22

x's c. Identify intervals where the function is increasing

$(-\infty, -.55]$ $[1.22, \infty)$



x's d. Identify intervals where the function is decreasing

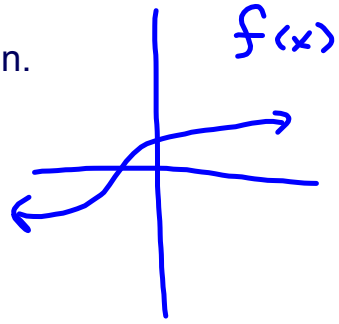
$[-.55, 1.22]$

13. Let $f(x) = \sqrt[3]{x + 5}$

a. Explain why f has an inverse that is also a function.

passes horizontal line test

1-1 function



b. Find f^{-1} and state its domain.

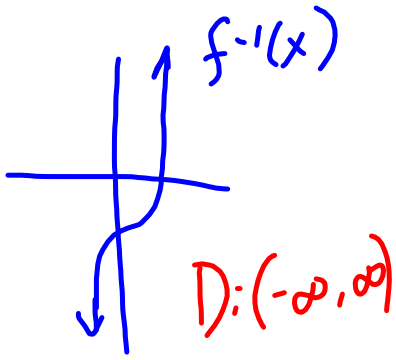
$y = \sqrt[3]{x+5}$

$(x)^3 = \left(\sqrt[3]{y+5}\right)^3$

$x^3 = y + 5$

$x^3 - 5 = y$

$f^{-1}(x) = x^3 - 5$



14. Using your calculator, determine a linear and quadratic regression for the data from the table.

Consumer Price Index (Housing)		
Year	x's	Housing CPI y's
1990	0	128.5
1995	5	148.5
2000	10	169.6
2002	12	180.3
2003	13	184.8
2004	14	189.5
2005	15	195.7
2006	16	203.2
2007	17	209.6

Which one is better suited to the data?

Linear STAT

CALC

LinReg(ax+b)

$y = 4.694x + 125.656$

$r^2 = .9908$

STAT

EDIT

L_1 L_2

Quadratic $y = .088x^2 + 3.172x + 129.103$

$r^2 = .9987$

r^2 closer to 1 is best fit