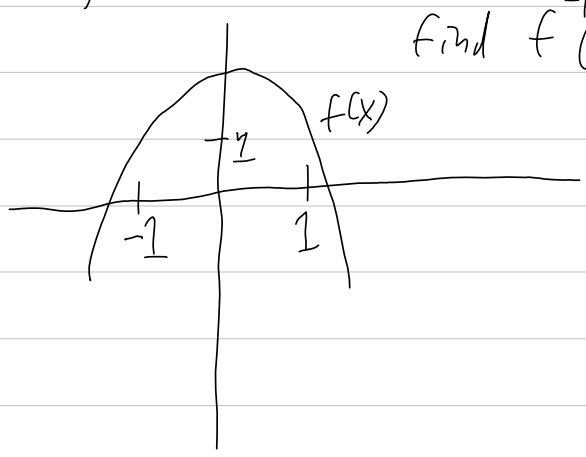
Ann: -wk: 2 today (Last 30 min) w3M1
-wk: 3 Friday

Preview: 1) Is $x^2+y=4$ a func of x? y?

2) find $f(x^2-4)$ if $f(y)=y^2+2$

3) evaluate $(f/g)(-3)$ where
$f(x)=x^2+2$
$g(x)=x+3$

4) find $f^{-1}(\{13\})$



5) is $\{(1,2),(3,2),(1,3)\}$ a function?

Content: M3.d1 (extend)
M3.d2

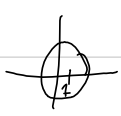
Defn: - A relation R is a set of ordered pairs: $\{(x,y) \mid x\in X, y\in Y\}$

- A function is a relation such that for each $x\in X$, there is one and only one y such that $(x,y)\in R$.

non-ex) $\{(1,2),(1,4),(5,4)\}$

$1\to 2$, $1\to 4$ Bad

non-ex) let R be points on



Note (1, some pos) and (1, some neg) are in R, so not a func.

Notation:

$f: A \to B$ (f: name, A: domain, B: codomain)

$a \mapsto f(a)$ (rule)

ex) $f: \mathbb{Z} \to \mathbb{Q}$, $z \mapsto z/2$ } Common on whiteboard

also Notation: ex) let $g: \mathbb{R}\to\mathbb{R}$ where $g(r)=r^2+2$ — Common in writing

def: The image (or range) of $f: A\to B$ is $\{f(a): a\in A\}$, i.e. the values f may achieve in B.

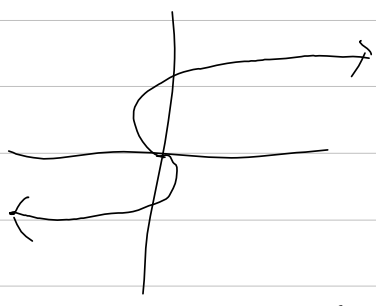
Goto M3.d1

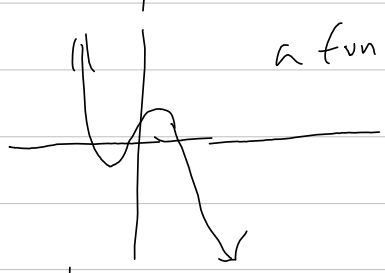
Ann: - Test 2 - Feb 17th + 18th W3W1
- wiki 3 - Friday

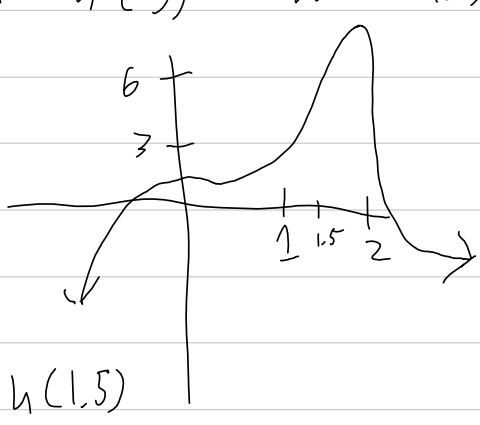
(Preview: 1) $3x+4y=7$
find line $\perp$ through $(1,3)$

2) $f(w)=yw^2-w\cdot 3$
find $f(x-2)$

3) is $5x+|y|=5x$ a function of x? y?

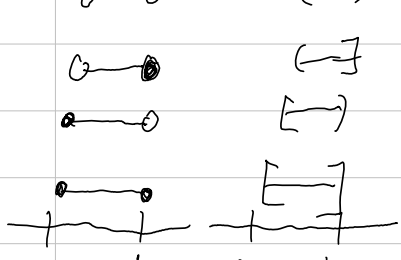
4) Is  a function?

is  a func?

5) find $h^{-1}(3)$ where $h(x)$ is 

find $h(1.5)$

Content:
BB 3.1 — $\mathbb{R}^2$ as groups
Class — BB 3.2 - me, you style
2 skipped
Class 1, 2 give def of domain and Image again.

Class 2 did
Content: BB 4.1a, 4.1b+c Before: Interval notation
Defn: I.N. (note $a<b$ always)
Alekswh. Numberline
$(a,b)=\{r\in\mathbb{R}: a<r<b\}$
$(a,b]=\{r\in\mathbb{R}: a<r\leq b\}$
$[a,b)=\{r\in\mathbb{R}: a\leq r<b\}$
$[a,b]=\{r\in\mathbb{R}: a\leq r\leq b\}$


W3F Struct
Class 1
subset $\subseteq$ $\mathcal{U}$ - Universe
Defn: Let A, B be two sets.
intersection: $A\cap B=\{a\in A: a\in B\}=\{b\in B: b\in A\}$ - in both
Union: $A\cup B=\{u\in\mathcal{U}: u\in A \text{ or } u\in B\}$ — Share together.
setminus: $A\setminus B=\{a\in A: a\notin B\}$ — A take away B.
ex) $\{1,2\}\cap\{2,3\}=\{2\}$
$\{1,2\}\cup\{2,3\}=\{1,2,3\}$
$\{1,2\}\setminus\{2,3\}=\{1\}$
I'll use for performance/clarity, not used in Alekes/tests

Class 2
Now 4.1a

Domain and Range:
Recall: $f: A\to B$
domain, codomain
inputs, outputs
Def: $f(A)=\text{Image}(f)\subset\text{Range}(f)$
$=\{b\in B: \exists a\in A \text{ s.t. } f(a)=b\}$
$=\{f(a): a\in A\}$

Def: A function f is Continous at x if for every $\varepsilon>0$, there exists $\delta>0$ such that for all x' with $|x-x'|<\delta$, then $|f(x)-f(x')|<\varepsilon$.
graphically: it doesn't jump at x.

A function is Continous if it is cont. ous for all x in its domain.

Def: Let $A\subseteq\mathcal{U}$ and $f: A\to B$. The excluded values of f is $\mathcal{U}\setminus A$.

ex: let f have rule $f(x)=\frac{1}{x}$.
then the largest domain $A\subseteq\mathbb{R}$ that f can have is $A=(-\infty,0)\cup(0,\infty)$.
So the excluded values of f is $\{0\}$.

Now 4.1b and 4.1c

w4m1

class only

subset $\subseteq U$ — universe

Defn: Let A, B be two sets.

intersection: $A \cap B = \{a \in A : a \in B\} = \{b \in B : b \in A\}$ — in both

Union: $A \cup B = \{u \in U : u \in A \text{ or } u \in B\}$ — share together.

Setminus: $A \setminus B = \{a \in A : a \notin B\}$ — A take away B.

ex) $\{1,2\} \cap \{2,3\} = \{2\}$

$\{1,2\} \cup \{2,3\} = \{1,2,3\}$

$\{1,2\} \setminus \{2,3\} = \{1\}$

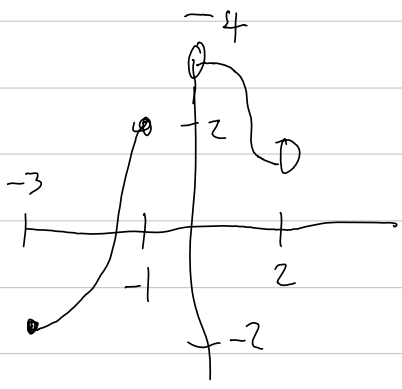
I'll use for exposition/clarity, not used in Alekes/tests

wk 3 start

(P)review 1) $f(x) = \dfrac{\sqrt{10x-1}}{x^2+4x+4}$ Dom in?

2) Domain of $\sqrt{(x-8)(4-x)}$

3)



Dom?

Rng?

inc?

dec?

4) $f(x) = x^2 - 2x + 1$ find

average rate of change from $x=1$ to $x=2$

$\dfrac{f(2)-f(1)}{2-1}$

plot secant line.

5) Range of $3x^2+4x+1$?

6) Dom + range of $\{(1,0),(3,4),(17,81),(e,4)\}$?

Content: Average rate of Change (ARoC)

Defi: Average rate of change of f between $x = x_1$ and $x = x_2$ is slope of secant line between $(x_1, f(x_1))$ and $(x_2, f(x_2))$

ie $\dfrac{f(x_2)-f(x_1)}{x_2 - x_1}$

ex) $f(x) = \sqrt{x-4}$; find ARoC between $x=4$, $x=8$

$\dfrac{f(8)-f(4)}{8-4} = \dfrac{\sqrt{8-4}-\sqrt{4-4}}{4} = \dfrac{\sqrt{4}-0}{4} = \dfrac{2}{4} = \dfrac{1}{2}$

Now 4.2*

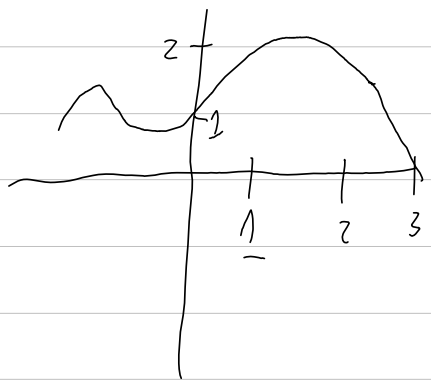
w3+w1

Ann: wk 4

(P) review

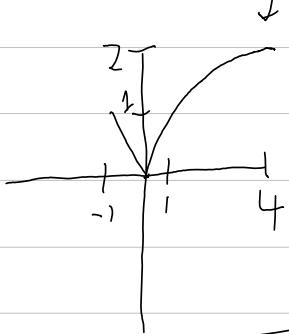
1) Domain of $\frac{\frac{1}{x^2-4}}{\sqrt{\frac{1}{x}-8}}$

2) find AROC from $x=1$ to 3 on



3) graph $y = -2|x-1|+2$

4) graph of f ; graph $-\frac{1}{2}f(2x-1)+2$



Content: 4.2*, get into 5.

W4F1

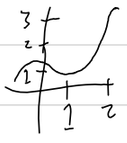
Ann: - Subs all next week
- If wiki failed to submit
  - get class average

- Test 2 2/17-2/18

First 10ish: - get w/ wiki groups and discuss answers.
- talk to other groups around and discuss

go over wiki:

(P) review:



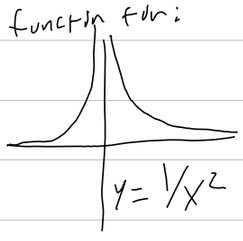
1) Find ARoC for f(x) from x=1 to 2
write corresponding secant line.

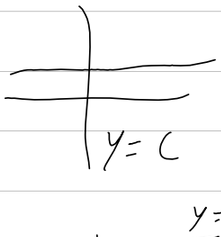
2 you) find domain of
$$f(x) = \frac{\sqrt{x+10}}{3x-7}$$

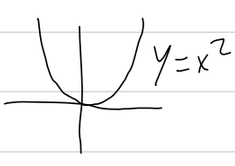
3) graph $4|x-5|+3$

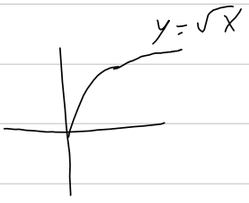
4 you) graph $-(x-4)^2$

5) function four:









6) graph $y = x^2 - 6x + 7$

$y = x^2 - 2 \cdot 3x + 9 - 9 + 7$

$y = (x-3)^2 - 2$

7 you) graph $y = 2(x+4)^2 + 1$

rest: Aleks time