Ann: Test 2 today + Tuesday W6M1

6.1 piecewise

(P) review:

1) Rewrite w/ no neg. exponents

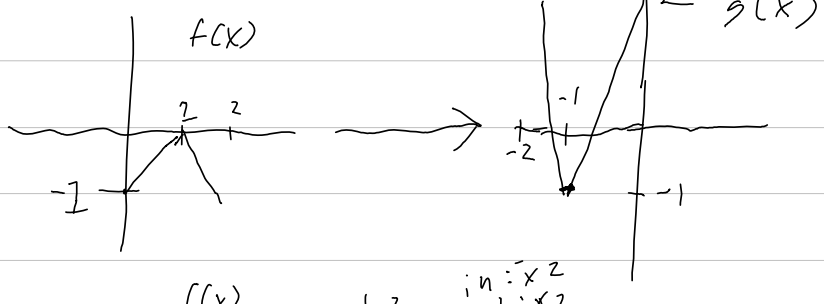
$$\frac{2^{-48}(z^3y^{-4})^2}{8^{17}z^0(xzy)^{-3}}$$

2) $X = 7y - 3$ find $\perp$ line through $(4,8)$

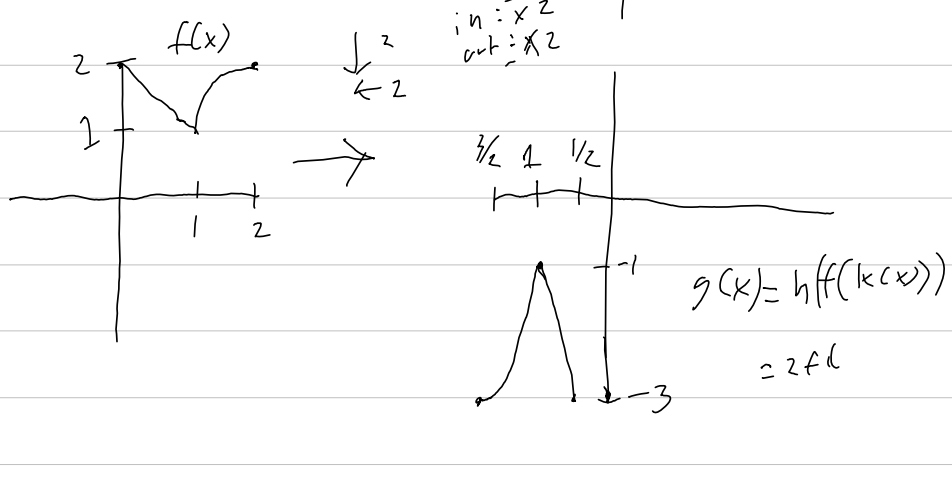
3) Is $\sqrt{x} + \sqrt{y} = 4z$ a function of (x,z)?

name x: $y^2 = x^2 - 1$

4 me) describe the transformation:

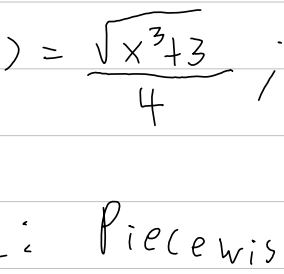


4 you)



Preview:

5) describe f:



Ans: $f(x) = \begin{cases} -1 & x \le 1 \\ x+2 & -1 < x \le 0 \\ 1 & x = 1 \end{cases}$

6) $f(x) = \frac{\sqrt{x^3+3}}{4}$; find $h, g \neq id$ s.t. $h \circ g = f$.

Content: Piecewise defined functions

Def: If the rule for $f: A \to B$ on some $U \subset A$ and $A \setminus U$ is different, then f is piecewise defined.

ex)* $f: \mathbb{R} \to \mathbb{R}$, where $f(x) = x^2$ on $(0,1)$ and $f(x) = x+1$ elsewhere.

Notation: If $f: A \to B$ is piecewise defined on U its rule can be written as

$$f(x) = \begin{cases} g(x) & x \in U \\ h(x) & x \notin U \text{ (or } x \in A \setminus U) \end{cases}$$

ex)* $f(x) = \begin{cases} x^2 & x \in (0,1) \\ x+1 & x \in (-\infty, 0] \cup [1, \infty) \end{cases}$

or

$$f(x) = \begin{cases} x+1 & x \le 0 \\ x^2 & 0 < x < 1 \\ x+1 & x \ge 1 \end{cases}$$

you) write rule for

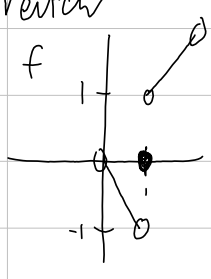
Now) 6.1

finish: Alex time.

Composition

(P) review

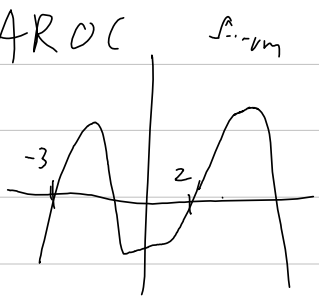
1) f



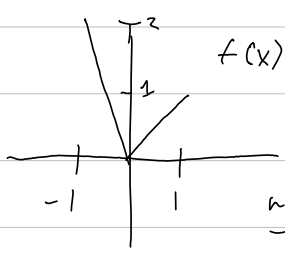
write the rule for f.

2) $\sqrt{y} = \sqrt{x} - 1$ is it a function of x? domain?

3) AROC from $x=-3$ to $x=2$ on



4 you) $f(x)$; draw $-f(\frac{1}{2}x)+2$



x2 on x

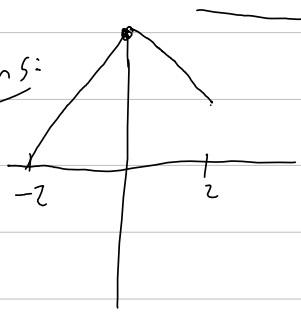
in

x-axis

out

+2

ans:



5) $H(x) = (6x-2)^2$

find f, g st. $f \circ g = H$.

$$(6x-2)^2 = \underbrace{((x \mapsto x^2) \circ (x \mapsto x-2)}_{f} \circ \underbrace{(x \mapsto 6x))}_{g}(x)$$

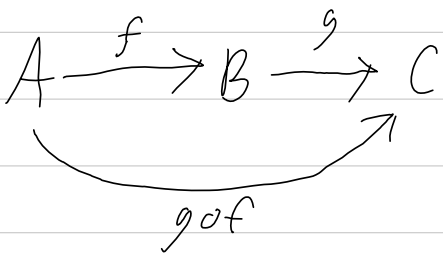
read right to left.

Content: Composition.

Def: Suppose $f: A \to B$ and $g: B \to C$, then $g \circ f : A \to C$ is the function

$(g \circ f)(x) = g(f(x))$ "g (post) composed with f"

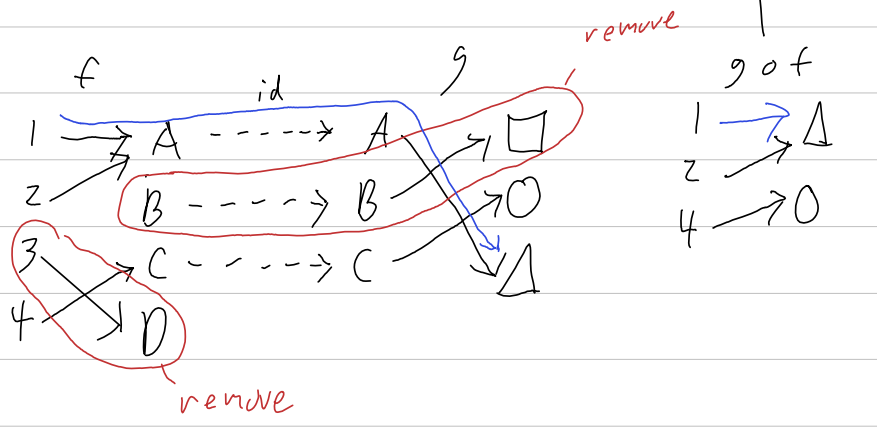
"f pre composed w/ g"



Here: if $f: A \to B$, $g: C \to D$ where $C \subset B$, then

"$g \circ f$" $= g \circ (f|_{f^{-1}(C)})$

ex)



ex) $f: \mathbb{R} \to \mathbb{R}$, $x \mapsto x^2 - 1$ $\quad g: \mathbb{R}_{\geq 0} \to \mathbb{R}$, $x \mapsto \sqrt{x}$

"$g \circ f$" $= g \circ \tilde{f}$ where $\tilde{f}$ is f with restricted domain so that $\tilde{f}$'s range is $\mathbb{R}_{\geq 0}$

ie, $x^2 - 1 \geq 0 \Rightarrow |x| \geq 1 \Rightarrow x \in (-\infty, -1] \cup [1, \infty)$

"$g \circ f$": $(-\infty, -1] \cup [1, \infty) \to \mathbb{R}$

$x \mapsto \sqrt{x^2 - 1}$

you) $f(x) = (x+1)(x-2)$; $g(x) = \frac{1}{x}$

find $g \circ f$'s rule and domain.

NOW BB 6.2