6W1

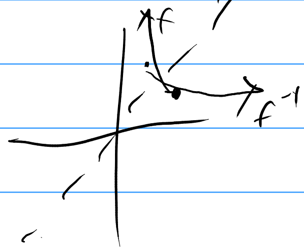
Mod 6 today

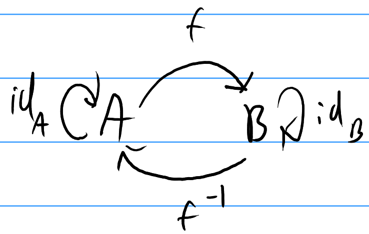
Test 3 notes

<u>Ann:</u> - Take test 3 today by 4:30 for full 75 min!

<u>Preview</u>: 1) $f(x) = 3(x-4)^2 + 2$ on $(-\infty, 4]$

find $f^{-1}(x)$.





isolate

$f(f^{-1}(x)) = 3(f^{-1}(x) - 4)^2 + 2$

$\quad \| $

$\quad x$

$\frac{x-2}{3} = (f^{-1}(x) - 4)^2$

from domain restr. or pic.

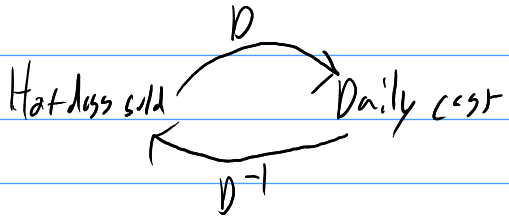
$-\sqrt{\frac{x-2}{3}} = f^{-1}(x) - 4$

$4 - \sqrt{\frac{x-2}{3}} = f^{-1}(x)$

2) you're costs at Rob's Hotdogs per day is 400\$ for cart and supplies and 50¢ per hotdog. Model this and interpret

6W2 its inverse function.

$D(h) = 400 + .5h$



$D^{-1}(C)$: $C = 400 + .5h$

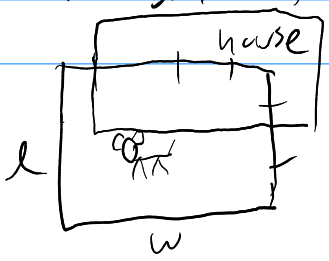
$C - 400 = .5h$

$2C - 800 = h$

$D^{-1}(C) = 2C - 800$

$D^{-1}(C)$ gives for a given daily cost, the number of hotdogs sold to achieve this cost.

3) (mod 7) You making a rectangular yard Half of and $\frac{3}{4}$ of 2 sides is encompased by your house. If you have 100 m of fence, what dimensions maximise doggo romp land?



6W3

$P = 100 = 1.5l + \frac{5}{4}w$

1) simplify

$4P = 400 = 6l + 5w$

2) isolate $l = \frac{400 - 5w}{6}$

$A = l \cdot w - \left(\frac{3}{4}l \cdot \frac{1}{2}w\right)$

$= l \cdot w - \frac{3}{8}lw$

$= \frac{5}{8}lw$

3) plug into other eq'ns

$A = \frac{5}{8}\left(\frac{400 - 5w}{6}\right)w$

4) maximum at vertex: (halfway between roots)

$0 = \frac{5}{8}\left(\frac{5 \cdot 80 - 5w}{6}\right)w$

$0 = \frac{5 \cdot 5}{8 \cdot 6}(80 - w)w$

$0 = (80 - w)w$

$w_1 = 80, w_2 = 0$

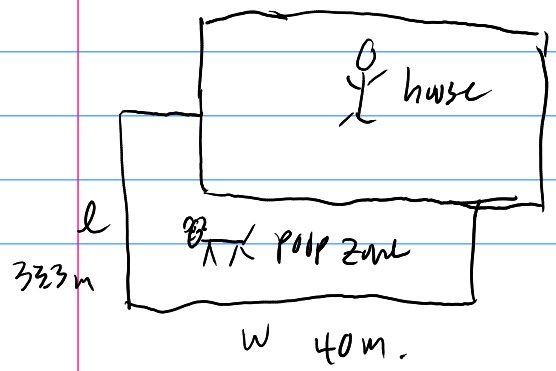
$mid = \frac{80 + 0}{2} = 40$

$w_{max} = 40$

l_{max} = plug in w_{max} into l eqn.

$= \frac{400 - 5 \cdot 40}{6}$

$= \frac{200}{6} = \frac{100}{3} \approx 33.3$



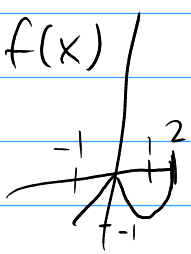
NIW: BB notes M6 on PN except ~~20~~ 10 one

6.1

6.2 inverses

(P) review: 1) $f(x) = 3x - 2$

find the line $\perp$ to the secant line on f through $x = 2, 4$ through $(3, f(3))$.

2) $f(x)$ 

draw $g(x) = 2f(-x) + 3$

3) $f(x) = \sqrt{6x + 30}$ on $[-5, \infty)$

plot $f^{-1}(x)$.

4) you: $f(x) = 2(x-1)^2$ on $[1, \infty)$

plot $f^{-1}(x)$.

skip

5) you: decompose $H(x) = \frac{7x^2 + 2}{3x^2 + 1}$ into a composition of two functions

Content: 6.2 Inverse functions

Def: A function f is injective (or one-to-one) if when $f(a) = f(b)$, then $a = b$.

Also said to pass the "horizontal line test"

(namely) 

$(-2)^2 = (2)^2$

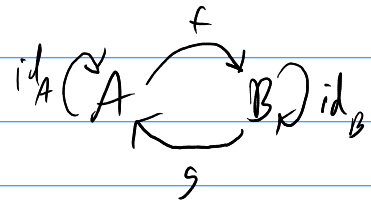
yet $-2 \neq 2$

6F2

Def: A function, $f: A \to B$, is surjective if the range of f is B. That is for every $b \in B$, there exists an $a \in A$ with $f(a) = b$.

non-ex) $f: \mathbb{Z} \to \mathbb{Z}$, $n \mapsto 2n$ no input gives 3.

Def: A function, $f: A \to B$ and a function $g: B \to A$ are inverses, if $f \circ g = id_B$ and $g \circ f = id_A$ where $id_c(c) = c$.

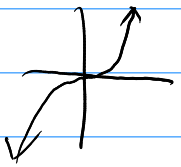


id_A id_B

Alt: $f(g(x)) = x$ and $g(f(y)) = y$

Fact: A function that is both injective and surjective is invertible.

ex) $f(x) = x^3$



is injective: pass H-line test ✓

surj: image is $\mathbb{R}$ ✓

$f^{-1}(x) = \sqrt[3]{x}$