Math 112

Q's $\sqrt{2 - \sqrt{(x-2)(x+2)}}$ Domain?

Domain Issues

① $\frac{1}{0}$ ← Not allowed

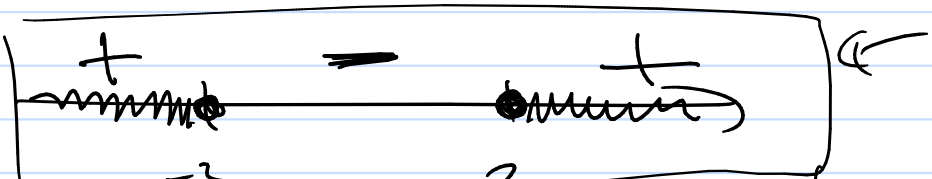
② $\sqrt{\text{negative}}$ ←

So $\sqrt{2 - \sqrt{(x-2)(x+2)}}$ ← ①

Need: $(x-2)(x+2) \geq 0$ (not negative)

Part 1

Sign table for $(x-2)(x+2)$



$(-\infty, -2] \cup [2, +\infty)$

$x \leq -2 \cup x \geq 2$

Part 2

$2 - \sqrt{(x-2)(x+2)} \geq 0$

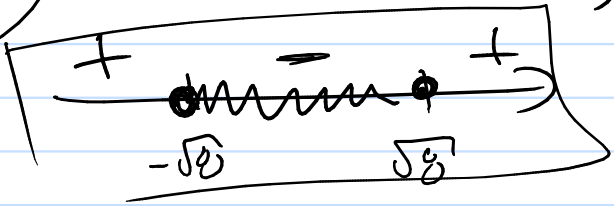
$2 \geq \sqrt{(x-2)(x+2)}$

$4 \geq (x-2)(x+2)$

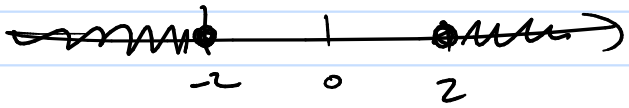
$4 \geq x^2 - 4$

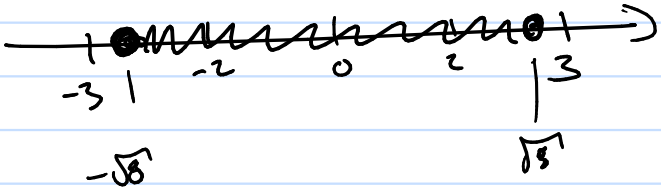
$0 \geq x^2 - (\sqrt{8})^2$

$0 \geq (x + \sqrt{8})(x - \sqrt{8})$

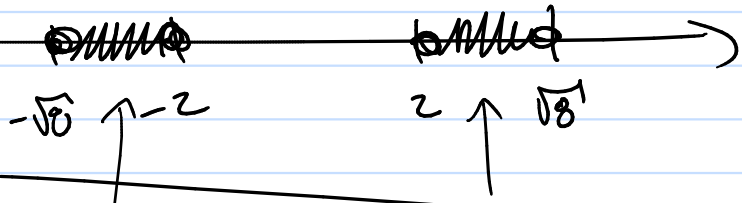


Part 1 and Part 2





together:



$[-\sqrt{8}, -2] \cup [2, \sqrt{8}]$

$-\sqrt{8} \le x \le -2 \cup 2 \le x \le \sqrt{8}$

S.1 #1

1 Let $f(x) = \dfrac{1}{x-5}$ and $g(x) = 2x + 9$.

Then $(f \circ g)(4) =$,

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$f(17) = \dfrac{1}{17-5}$ $\quad$ $g(4) = 2(4) + 9 = 17$

$(f \circ g)(4) = f(g(4)) = f(17) = \dfrac{1}{12}$

5.1 #1

1 Let $f(x) = \dfrac{1}{x-5}$ and $g(x) = 2x + 9$.

Then $(f \circ g)(4) =$ $\frac{1}{12}$,

$(f \circ g)(x) =$ $\frac{1}{2x+4}$.

$f(\boxed{2x+9}) = \dfrac{1}{\boxed{2x+9} - 5}$ $\quad g(\boxed{x}) = 2\boxed{x} + 9$

$f(g(x)) = f(2x+9) = \dfrac{1}{2x+9-5}$

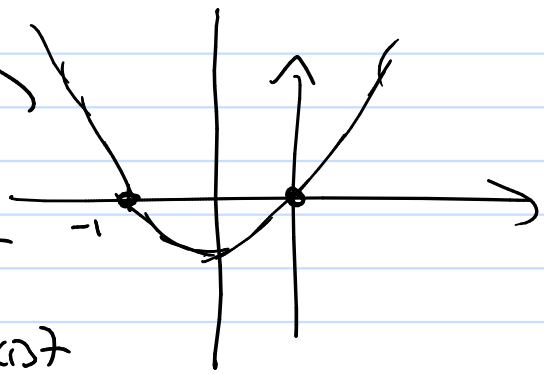
$= \boxed{\dfrac{1}{2x+4}}$

$f(x) = \dfrac{1}{x-4}$ $\quad g(x) = 4x + 9$

$f(\boxed{13}) = \dfrac{1}{\boxed{13} - 4}$ $\quad g(\boxed{1}) = 4\boxed{1} + 9$

$(f \circ g)(1) = f(\underbrace{\boxed{g(1)}}_{13}) = f(13) = \boxed{\dfrac{1}{9}}$

Inverses: $y = x^2 + x = x(x+1)$

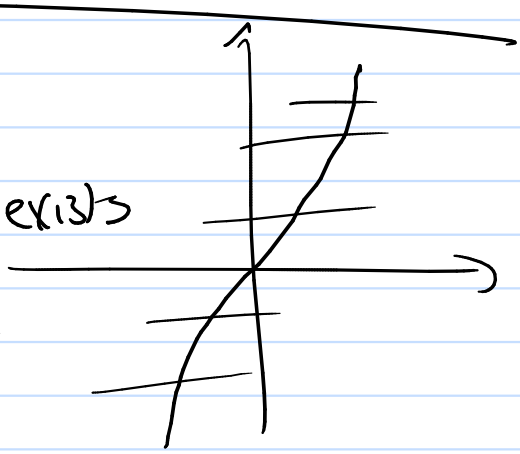


Does not pass horz. line test

so f^{-1} does not exist

$y = x^3 + x$

passes horz. line test so f^{-1} exists



Find f^{-1}? swap x, y

$y = x^3 + x$

becomes $x = y^3 + y$

similar to $x^3 + x - 3 = 0$

$y^3 + y - x = 0$

solve for y?

cubic formula

$y =$ [ ] $y =$ [ ] $y =$ [ ]