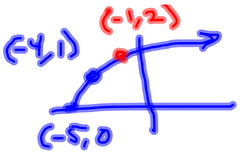
$f(x) = \dfrac{1}{x-2}$, $g(x) = \sqrt{x+5}$



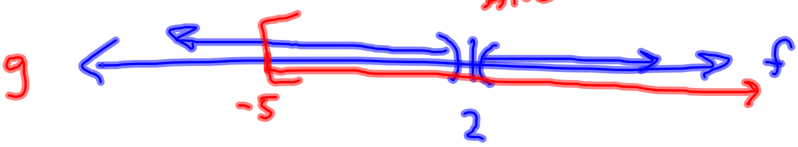
$\mathcal{D}(f) = \mathbb{R} \setminus \{2\} = \{x \mid x \neq 2\} = (-\infty, 2) \cup (2, \infty)$

$\mathcal{D}(g) = \{x \mid x+5 \geq 0\} = \{x \mid x \geq -5\} = [-5, \infty)$

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

$\mathcal{D}(f+g) = \mathcal{D}(f) \cap \mathcal{D}(g)$

AND



No $[-5,2] \cup [2,\infty) = [-5,\infty)$

$\boxed{[-5,2) \cup (2,\infty)}$

$f(x) = \frac{1}{x-2}$, $g(x) = \sqrt{x+5}$

$(f \circ g)(x) =$

$f(g(x)) = f(\sqrt{x+5})$

$= \frac{1}{\sqrt{x+5} - 2}$

$(g \circ f)(x) =$

$g(f(x)) = \sqrt{\frac{1}{x-2} + 5}$

$\mathcal{D}(f) = \mathbb{R} \setminus \{2\} = \{x \mid x \neq 2\} = (-\infty, 2) \cup (2, \infty)$

$\mathcal{D}(g) = \{x \mid x+5 \geq 0\} = \{x \mid x \geq -5\} = [-5, \infty)$

$\mathcal{D}(f \circ g) = \{x \mid \underbrace{x \in \mathcal{D}(g)}_{x \geq -5} \text{ AND } \underbrace{g(x) \in \mathcal{D}(f)}\}$

$\sqrt{x+5} \in \underbrace{\mathcal{D}(f)}$

$\sqrt{x+5} \neq 2$

Solve $\sqrt{x+5} = 2$

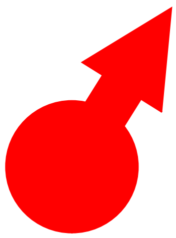
$(\sqrt{x+5})^2 = 2^2$

$x+5 = 4$

$x = -1$

Need $x \neq -1$

A
N
D



$\{x \mid x \geq -5 \text{ and } x \neq -1\}$

$= [-5, -1) \cup (-1, \infty)$

$f(x) = \frac{1}{x-2}, \quad g(x) = \sqrt{x+5}$

$\mathcal{D}(f) = \mathbb{R} \setminus \{2\} = \{x \mid x \neq 2\} = (-\infty, 2) \cup (2, \infty)$

$\mathcal{D}(g) = \{x \mid x+5 \geq 0\} = \{x \mid \underline{x \geq -5}\} = [-5, \infty)$

$\mathcal{D}(g \circ f) = \{x \mid \underbrace{x \in \mathcal{D}(f)}_{x \neq 2} \text{ and } \underbrace{f(x) \in \mathcal{D}(g)}\}$

Need $f(x) \geq -5$

$\boxed{\frac{1}{x-2} \geq -5}$

Chapter 3

In C3, we'll solve these:

$\frac{1}{x-2} + 5 \geq 0$

$\frac{1}{x-2} + 5\left(\frac{x-2}{x-2}\right) \geq 0$

$\frac{5}{1} \cdot \frac{(x-2)}{x-2} = \frac{5x-10}{x-2}$

$\frac{1+5x-10}{x-2} = \frac{5x-9}{x-2} \geq 0$

Critical pts

+	−	+

$0 \quad \frac{9}{5} \quad 2$

Let $x=0$

$\frac{5(0)-9}{0-2} = \frac{-9}{-2} = \frac{9}{2} > 0$

So, we have $(-\infty, \frac{9}{5}] \cup [2, \infty)$, here.

Great Test 3 Question.

Combine with $x \neq 2$:

$\boxed{(-\infty, \frac{9}{5}] \cup (2, \infty) = \mathcal{D}(g \circ f)}$

WAY hard.

$2x+4 \geq 0$
$2x \geq -4$
$x \geq -2$

5. Let $f(x) = \sqrt{2x+4}$ and $g(x) = \underline{4x - 2}$.

a. Determine each of the following functions and state domain of each.

i. $(f+g)(x)$

$\mathcal{D}(f) = \{x \mid 2x+4 \geq 0\}$
$= \{x \mid \boxed{x \geq -2}\}$

ii. $(f-g)(x)$

$\mathcal{D}(f \circ g) = ?$

$= \{x \mid \underbrace{x \in \mathcal{D}(g)}_{(-\infty,\infty)} \overset{\cap}{\text{and}} \underbrace{g(x) \in \mathcal{D}(f)}_{\boxed{4x-2 \geq -2}}\}$

iii. $(f \cdot g)(x)$

$x \geq 0$

$\mathcal{D}(f \circ g) = \{x \mid x \geq 0\}$
$= [0,\infty)$

y is directly proportional to x

$y = 32$ when $x = 1$.

what's y when $x = 7$?

$$\boxed{y = Kx}$$

$32 = K \cdot 1$

$32 = K$

when $x = 7$

$y = 32x$

$= 32(7)$

$= 224$

---

y varies jointly as x and z and inversely with the cube root of w.

If $y = 11$ when $x = 3$, $z = 5$, $w = 27$

what's y when $x = 5$, $z = 10$, $w = 64$?

$$\boxed{y = K\frac{xz}{\sqrt[3]{w}}}$$

$11 = K\frac{3 \cdot 5}{\sqrt[3]{27}} = 5K$

$\frac{11}{5} = K$

$$y = \frac{11}{\cancel{5}}\left(\frac{\cancel{5} \cdot 10}{\sqrt[3]{64}}\right) = \frac{11 \cdot 10}{4} = \frac{11 \cdot 5}{2}$$

$$\boxed{y = \frac{55}{2}}$$

$\propto$

$$F = \frac{G m_1 m_2}{r^2}$$

$$F \propto \frac{m_1 m_2}{r^2}$$

proportional

G is the "K"

Cassie & Ian

$f(x) = 2x^2 - 7$

Find $\frac{f(x+h) - f(x)}{h}$ & simplify.

$(x+h)^2 = x^2 + 2xh + h^2$

$$\frac{2(x+h)^2 - 7 - (2x^2 - 7)}{h}$$

$$= \frac{2(x^2 + 2xh + h^2) - 7 - 2x^2 + 7}{h} = \frac{2x^2 + 4xh + 2h^2 - 2x^2}{h}$$

$$= \frac{4xh + 2h^2}{h} = \frac{h(4x + 2h)}{h} = 4x + 2h$$

$4(1) + 2(4) = 12$

What's the average rate of change of $f(x)$ from $x_1 = 1$ to $x_2 = 5$?

$\boxed{x = 1}$

$x + h = 1 + 4 = x + 4$

$\boxed{h = 4}$

$$\frac{f(5) - f(1)}{5 - 1} = \frac{2(5)^2 - 7 - (2(1)^2 - 7)}{4} = \frac{50 - 7 - 2 + 7}{4}$$

$$= \frac{48}{4} = 12$$

Creepy.

$f(x) = |2x-1|$ is $\boxed{\text{NOT 1-to-1}}$

Suppose $f(x_1) = f(x_2)$

$|x| = 7$

$x = 7$ or $x = -7$

$|2x_1 - 1| = |2x_2 - 1|$

Showing/checking 1-to-1 algebraically

$2x_1 - 1 = 2x_2 - 1$ or $2x_1 - 1 = -(2x_2 - 1)$

$2x_1 = 2x_2$ $\quad$ $2x_1 - 1 = -2x_2 + 1$

$x_1 = x_2$ or $2x_1 = -2x_2 + 2$

$x_1 = -x_2 + 1$

Two different inputs give the same output.

1-to-1:

Using this one → $\boxed{\text{If } f(x_1) = f(x_2), \text{ then } x_1 = x_2}$

If $x_2 \neq x_1$, then $f(x_1) \neq f(x_2)$

$3x_1 - 1 = 3x_2 - 1$

$3x_1 = 3x_2$

$x_1 = x_2$

So, $3x - 1 = f(x)$ is 1-to-1.

$\sqrt{x}$ is 1-to-1

$x_1^2 = x_2^2$

$\sqrt{x_1^2} = \sqrt{x_2^2}$

$|x_1| = |x_2|$

$\boxed{\text{Not 1-to-1}}$

$x_1 = x_2$ or $x_1 = -x_2$

$x_1 = \pm x_2$