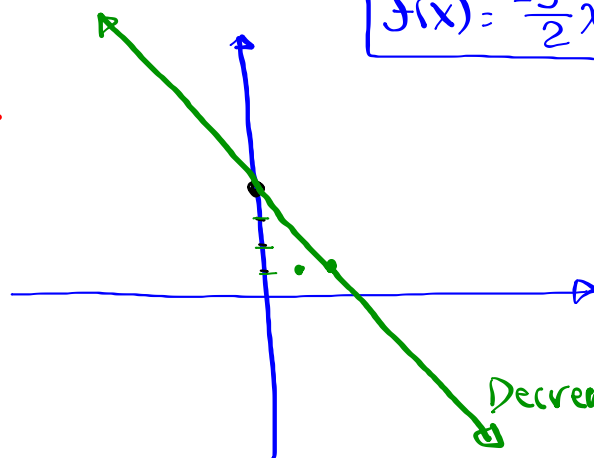**Math 245**

Spring 2022

Lecture 19

---
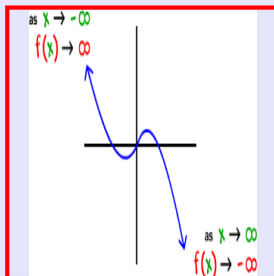
find a linear function with slope $\frac{-3}{2}$ and Y-Int at (0,4).

$\longrightarrow f(x) = mx + b$

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

Draw it.

Decreasing function

Draw and shade:

$f(x) \leqslant 3$ and $g(x) > -2$

→ Constant ←
Function
"Horizontal line"

Dotted
line

Solid
line

Shade below

Shade above
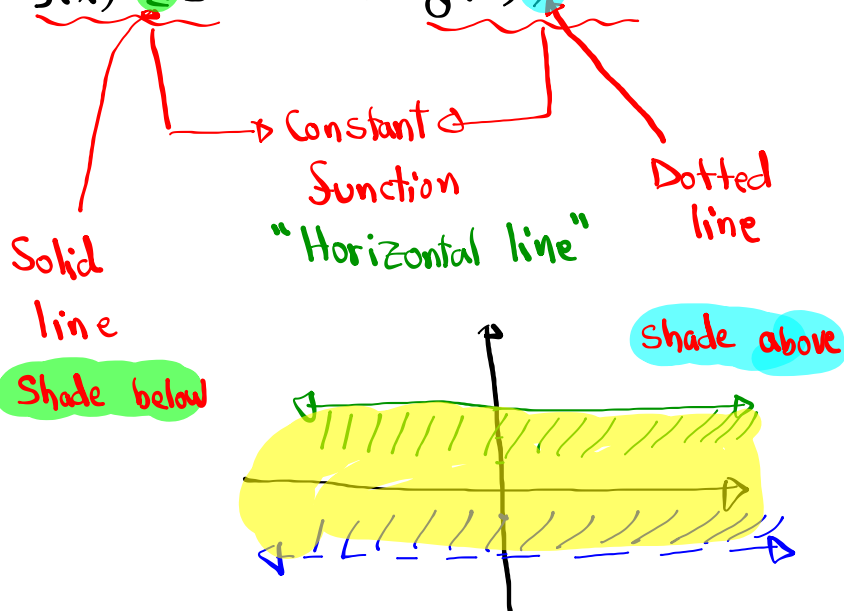
$f(x) = 3x - 2$ $g(x) = 2x + 3$

find

Multiplication

1) $(f \cdot g)(x) = f(x) \cdot g(x) = (3x-2) \cdot (2x+3)$

$= 6x^2 + 9x - 4x - 6 = \boxed{6x^2 + 5x - 6}$

2) $(f \circ g)(x) = f(g(x)) = 3g(x) - 2$

Composition

$= 3(2x + 3) - 2$

$= 6x + 9 - 2 = \boxed{6x + 7}$

$f(x) = 3x + 4$ $g(x) = \dfrac{x-4}{3}$

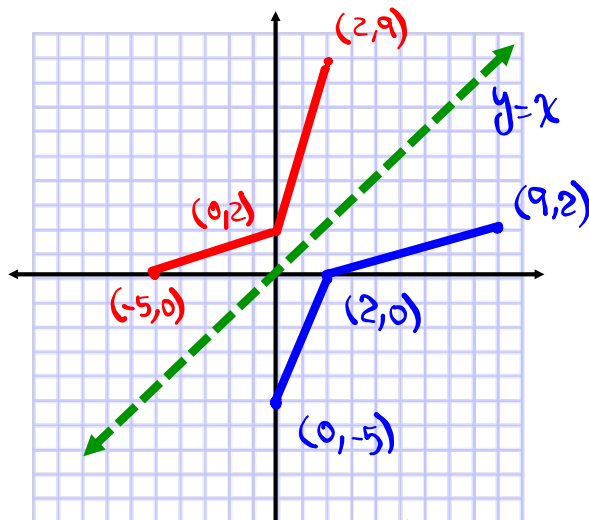find

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

$= 3\,g(x) + 4 = 3\left(\dfrac{x-4}{3}\right) + 4$

$= x - 4 + 4 = \boxed{x}$

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

$= \dfrac{f(x) - 4}{3} = \dfrac{3x + 4 - 4}{3} = \dfrac{3x}{3} = \boxed{x}$

Consider the graph below

(2,9)

y = x

(0,2)   (9,2)

(-5,0)   (2,0)

(0,-5)

1) Domain $-5 \leq x \leq 2$
$[-5, 2]$

2) Range $0 \leq y \leq 9$
$[0, 9]$

3) $\boxed{\text{Function}}$ or not?
Explain use V.L.T.

4) Intercepts
x-Int (-5,0)
Y-Int (0,2)

5) Switch x & y, then
draw a new graph.

Given $f(x) = 2x - 5$

1) find $f(0)$ and $f(3)$

$f(0) = 2(0) - 5$
$= 0 - 5$
$= \boxed{-5}$

$0 \longrightarrow -5$
$3 \longrightarrow 1$

$f(3) = 2(3) - 5$
$= 6 - 5$
$= \boxed{1}$

2) Solve $f(x) = 0$

$2x - 5 = 0$
$2x = 5$
$\boxed{x = \frac{5}{2}}$

$\frac{5}{2} \longrightarrow 0$
$4 \longrightarrow$

3) Solve $f(x) = 3$

$2x - 5 = 3$
$2x = 8$
$\boxed{x = 4}$

4) Replace $f(x)$ with y, then switch x & y, and Solve for new y. Replace the new y with $f^{-1}(x)$.

$f(x) = 2x - 5 \longrightarrow$
$y = 2x - 5$

$x = 2y - 5 \longrightarrow$
$x + 5 = 2y$

$y = \frac{x+5}{2}$

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

Class QZ 7

Graph in the same coordinate system

$\begin{cases} f(x) = \frac{3}{4}x - 3 \\ \\ g(x) = 2 \end{cases}$

$g(x)$

$(4, 0)$

$(0, -3)$

$f(x)$