

1.) $f \circ g(x)$
 $\hookrightarrow f(g(x))$

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

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

FOIL

$(2x-2)(2x-2)(2x-2) + 2x-2$
 $(4x^2 - 4x - 4x + 4)(2x-2) + 2x-2$

$(4x^2 - 8x + 4)(2x-2) + 2x-2$

$8x^3 - 16x^2 + 8x$

$+ -8x^2 + 16x - 8$

$8x^3 - 24x^2 + 24x - 8 + 2x - 2$

$8x^3 - 24x^2 + 26x - 10$

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

$f(x) * g(x)$

$(2x+2)(3x-1)$ FOIL

$6x^2 - 2x + 6x - 2$

$\Rightarrow 6x^2 + 4x - 2$

$6(4)^2 + 4(4) - 2$
 $6(16) + 4(4) - 2$
 $96 + 16 - 2$
 $112 - 2 = 110$

$f \cdot g(4)$

$f(4) * g(4)$
 $10 * 11 = 110$

$f(x) = 2x + 2$

$f(4) = 2(4) + 2$

$8 + 2 = 10$

$g(x) = 3x - 1$

$g(4) = 3(4) - 1$

$12 - 1 = 11$

$$\frac{f}{g}(-2)$$

\Downarrow

$$\frac{f(-2)}{g(-2)} = \frac{-(-2)^2 + (-2)}{4(-2) - 3} = \frac{-(4) + (-2)}{-8 - 3} = \frac{-4 - 2}{-8 - 3}$$

$$(g \circ f)(-2)$$

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

$$\frac{-6}{-11} = \boxed{\frac{6}{11}}$$

$$g(f(-2))$$

$$g(x) = 4x - 3$$

$$\boxed{f(-2)} = \boxed{\frac{(-2)^3 - (-2)^2 + (-2)}{-8 - 4 - 2} = -14}$$

$$g(-14)$$

$$g(x) = 4x - 3$$

$$4(-14) - 3$$

$$-56 - 3$$

$$\boxed{-59}$$

$$g(f(x))$$

$$4(x^3 - x^2 + x) - 3$$

$$4($$

Find inverse functions

- 1.) switch $y \Leftrightarrow x$
- 2.) Solve for y

$$y = -2 + \frac{2}{3}x$$

↓

$$x = -2 + \frac{2}{3}y$$

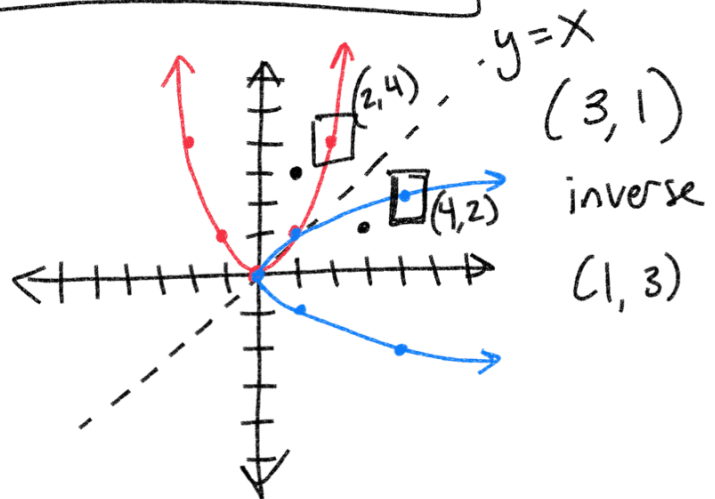
+2 +2

$$y = \frac{3}{2}(x+2)$$

$$\frac{3}{2}(x+2) = \left(\frac{2}{3}y\right) \frac{3}{2}$$

$$y = x^2$$

$$\sqrt{x} = \sqrt{y^2} \quad y = \pm\sqrt{x}$$



$$f(x) = \frac{3x}{5}$$

Find inverse

- 1.) Switch $x \Leftrightarrow y$
- 2.) Solve for y

$$y = \frac{3x}{5}$$

$$\frac{5}{3}(x) = \left(\frac{3y}{5}\right) \frac{5}{3}$$

$$y = \frac{5}{3}x$$

$$f(x) = \frac{5}{3}x$$

$$y = -1 + (x+1)^3$$

$$\begin{array}{ccc} \downarrow & & \downarrow \\ x = -1 + (y+1)^3 \end{array}$$

$$\begin{array}{ccc} +1 & +1 & \\ \downarrow & \downarrow & \\ \sqrt[3]{x+1} & = & \sqrt[3]{(y+1)^3} \end{array}$$

$$y = \sqrt[3]{x+1} - 1$$

$$\begin{array}{ccc} \sqrt[3]{x+1} & = & y+1 \\ -1 & & -1 \end{array}$$

Find the inverse function

$$y = \sqrt[3]{x} + 1$$

$$\begin{array}{ccc} \downarrow & & \downarrow \\ x = \sqrt[3]{y} + 1 \end{array}$$

$$\begin{array}{ccc} -1 & & -1 \\ \downarrow & & \downarrow \\ (x-1)^3 & = & (\sqrt[3]{y})^3 \end{array}$$

$$y = (x-1)^3$$