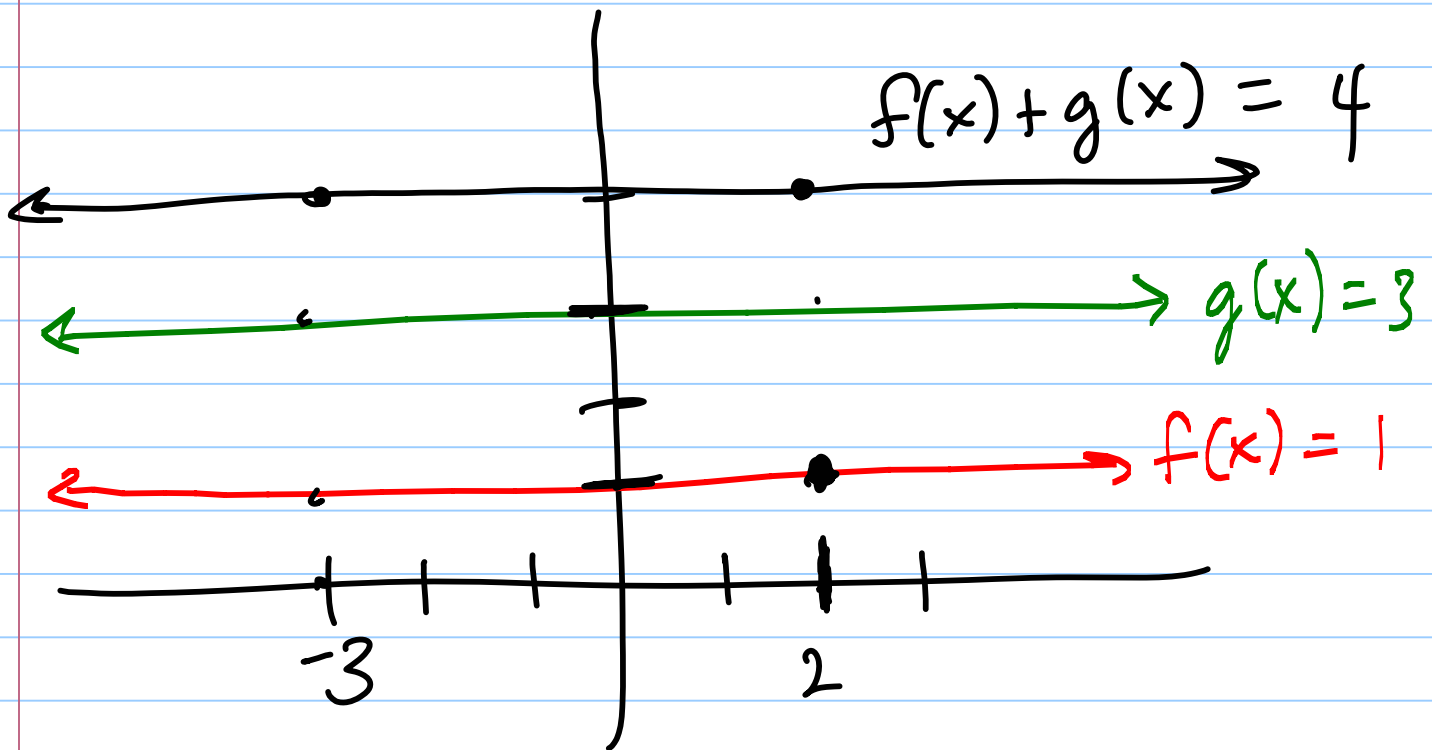


Section 4.2 / 4.3 Combining Functions

Note Title

9/23/2009



How would $f(x) + g(x)$ look?

$$\underbrace{f(2)} + \underbrace{g(2)} = \underbrace{1} + \underbrace{3} = 4$$

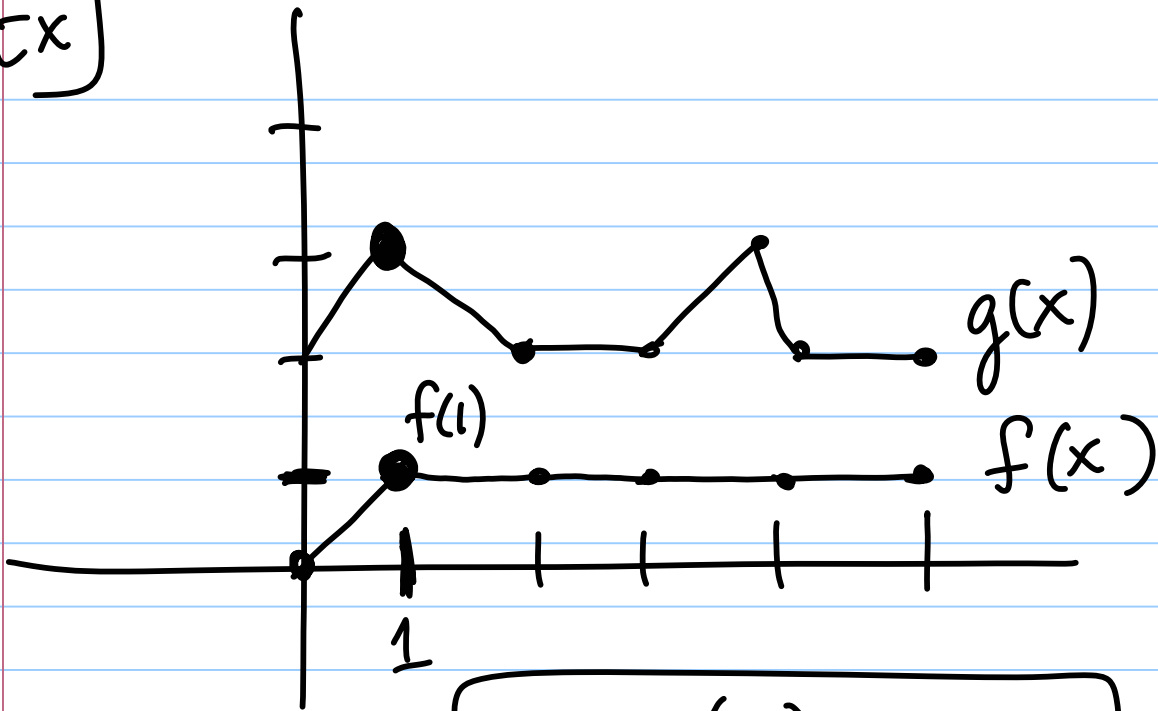
Ex) Given $f(x) = 2x^2 + 6x + 5$

$$g(x) = 3x^2 - 2x + 5$$

Find $(f + g)(x) = f(x) + g(x)$

Answer: $\boxed{5x^2 + 4x + 10}$

Ex)



What is $(f+g)(1) = 4$

$$\underbrace{f(1)} + \underbrace{g(1)}$$

$$1 + 3 = 4$$

Ex) Given $f(x) = 3x - 5$

$$h(x) = 2x^2 - x + 1$$

Find $(f-h)(x)$. Ex Profit =

$$f(x) - h(x),$$

$$3x - 5 - (2x^2 - x + 1)$$

$$= 3x - 5 - 2x^2 + x - 1$$

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

Revenue -
Cost.

Clicker # 1: $R(x) = 350x$

$$C(x) = 1000 + 26x + x^2$$

$$P(x) = R(x) - C(x)$$

$$= 350x - (1000 + 26x + x^2)$$

$$= 350x - 1000 - 26x - x^2$$

$$P(x) = -1000 + 324x - x^2 \quad \textcircled{D}$$

Quadratic

Multiplying Given $f(x) = x^2 + x + 3$
 $g(x) = 2x + 1$

find $f(x) * g(x)$.

	x^2	x	3
$2x$	$2x^3$	$2x^2$	$6x$
1	x^2	x	3

$$f(x) * g(x) = 2x^3 + 3x^2 + 7x + 3$$

I Clicker #2

Rent for an apt $20x + 400$

of apts rented : $100 - x$.

Revenue : $(20x + 400)(100 - x)$

Fixed Costs : \$ 1000

(D)

Variable Costs : \$ 5 / rented apt.

Total Cost : $5(100 - x) + 1000$

$$P(x) = (20x + 400)(100 - x) - (5(100 - x) + 1000)$$

Composition of Functions

Given $f(x) = x^2 + 2x$

a) $f(2) = 2^2 + 2(2) = 8$

b) $f(a) = a^2 + 2a$

c) $f(\text{🐰}) = \text{🐰}^2 + 2\text{🐰}$

d) $f(\underline{\underline{x+3}}) = \underline{\underline{(x+3)^2}} + \underline{\underline{2(x+3)}}$

composition of functions

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

Ex) $f(x) = x^2 + 2x$

$g(x) = x + 3$

→ $(f \circ g)(x) = f(g(x)) = f(x + 3)$

$$\rightarrow (x+3)^2 + 2(x+3)$$

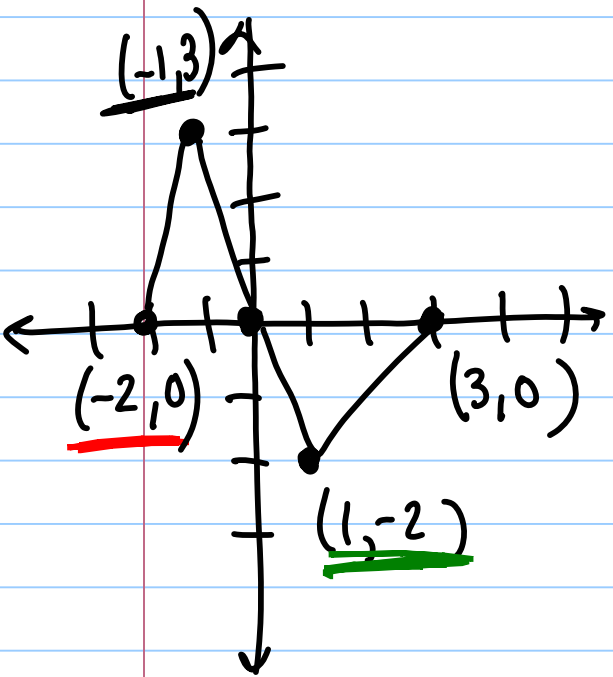
$$= x^2 + 6x + 9 + 2x + 6$$

$$= \boxed{x^2 + 8x + 15}$$

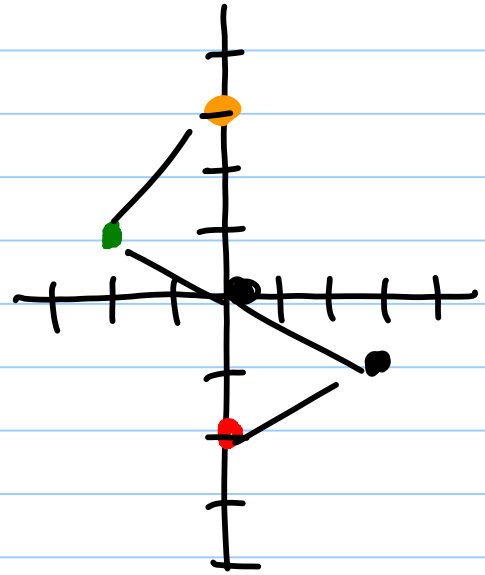
$$(g \circ f)(x)$$

$$(g \circ g)(x)$$

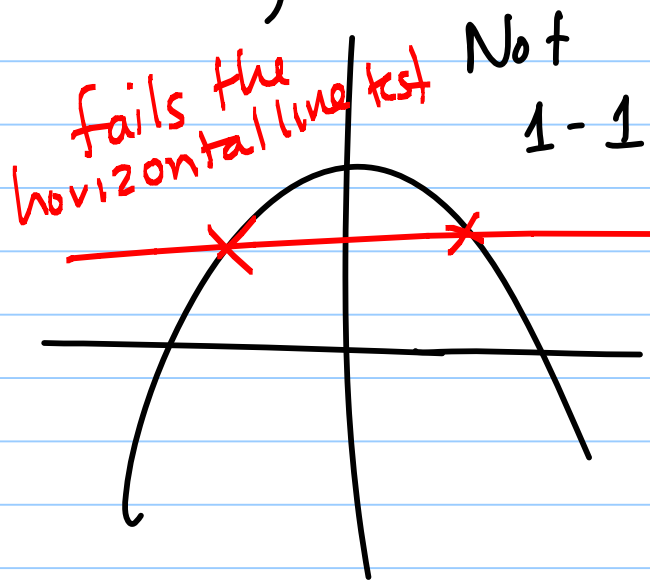
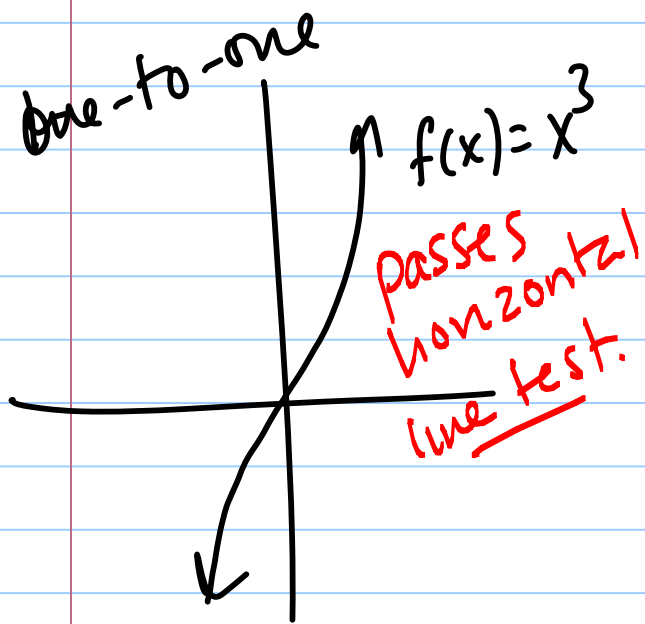
3.3 / Inverting Functions



SWITCH x, y
around to
Graph the
"inverse relation"

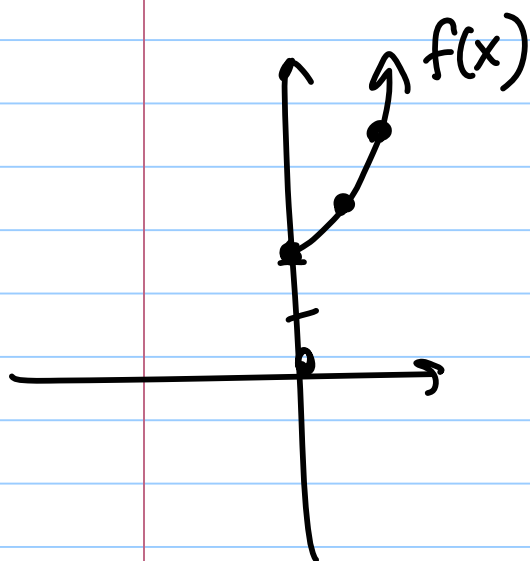


* For a function $f(x)$ to have an inverse, $f(x)$ must be a one-to-one function (passing the horizontal line test)



Ex) Find the inverse of $f(x) = x^2 + 2$,

$$x \geq 0$$



Steps

① change function label to "y"

$$\textcircled{1} y = x^2 + 2$$

② Switch x & y

$$\textcircled{2} x = y^2 + 2$$

③ Solve for y

$$\textcircled{3} x - 2 = y^2 \quad (\text{only keep positive part})$$
$$y = \sqrt{x - 2}$$

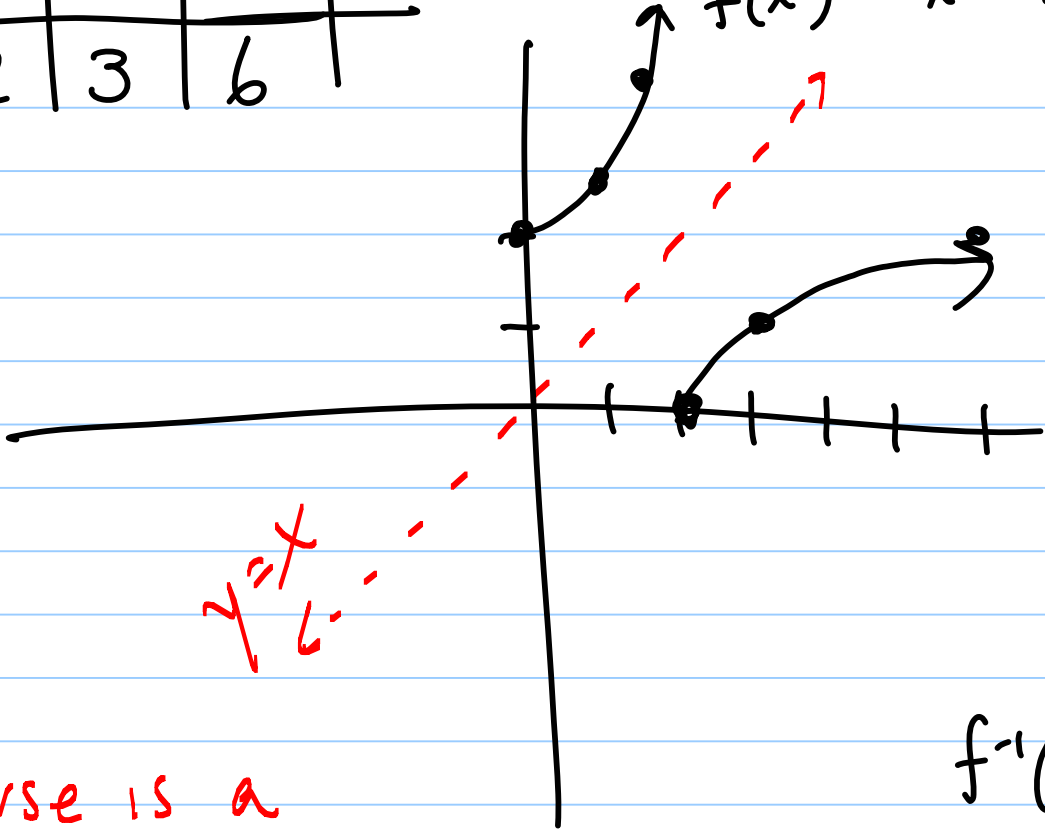
④ Change y to the inverse function label

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

x	0	1	2
f(x)	2	3	6

- (0, 2)
- (1, 3)
- (2, 6)

$$f(x) = x^2 + 2, x \geq 0$$



Inverse is a

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

reflection of $f(x)$ over the line $y = x$

IC3

$$T(x) = x + 34.5$$

① $y = x + 34.5$

② $x = y + 34.5$

③ $y = x - 34.5$

④ $T^{-1}(x) = x - 34.5$

