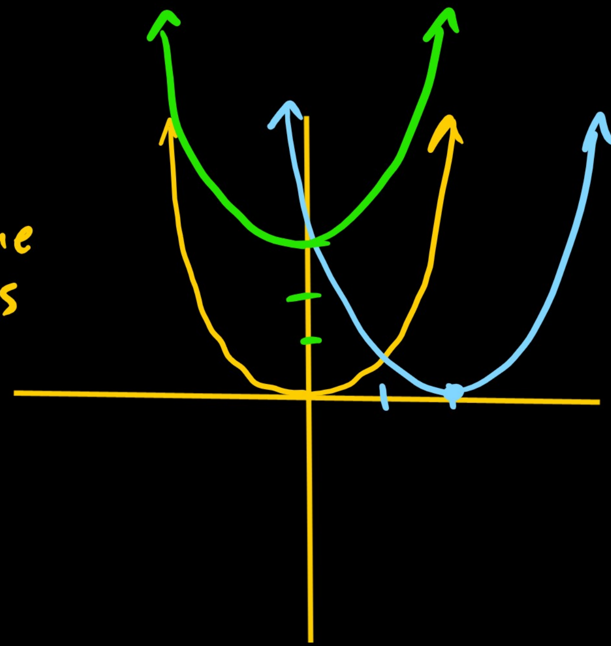
WARMUP

Graph $y = x^2$

2 Right $\longrightarrow$ $y = (x-2)^2$

3 up $\longrightarrow$ $y = x^2 + 3$

on same axes



Section 1.3 New Functions From Old

- Multiplying a function by a constant c vertically stretches the graph if $c > 1$ and vertically shrinks the graph if $0 < c < 1$. If $c < 0$ the graph is reflected about the x-axis and either stretched or shrunk.
- If you are given $y = f(x)$ $(k > 0)$ $(h > 0)$

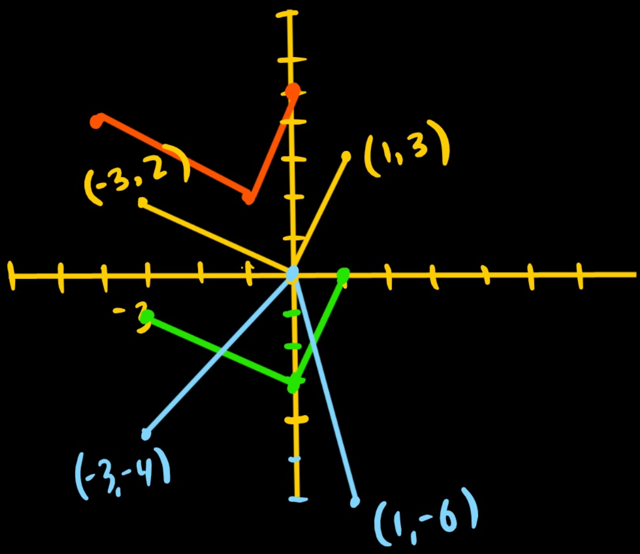
  $y = f(x) + k$ shifts $f(x)$ up k units

  $y = f(x) - k$ shifts $f(x)$ down k units

  $y = f(x - h)$ shifts $f(x)$ right h units

  $y = f(x + h)$ shifts $f(x)$ left h units

The graph of $y = f(x)$ is shown in yellow.



Graph $y = f(x) - 3$

$y = -2f(x)$

$y = f(x+1) + 2$

left 1, up 2

ex: $f(x) = x^2$

$g(x) = x + 1$

a) $f(g(1)) = f(\underbrace{1+1}_{g(1)}) = f(2)$

"composition"

$= 2^2 = 4$

b) $f(g(x)) = f(x+1) = (x+1)^2$

$= x^2 + 2x + 1$

$(x+1)(x+1)$

$x^2 + x + x + 1 = x^2 + 2x + 1$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

ex: $g(x) = x^2 + 2x + 3$

$g(2+h) = (2+h)^2 + 2(2+h) + 3$

$= 4 + 4h + h^2 + 4 + 2h + 3$

$= h^2 + 6h + 11$

$g(2) = 2^2 + 2 \cdot 2 + 3 = 4 + 4 + 3 = 11$

$g(2+h) - g(2) = h^2 + 6h + 11 - 11 = h^2 + 6h$

p21-23 1, 2, 4a, b, 5, 9, 15, 25, 26, 36

9) $q = f(p)$

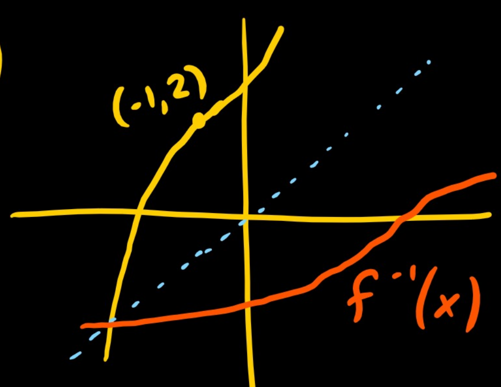
q ↓ # of items sold

p ↓ price

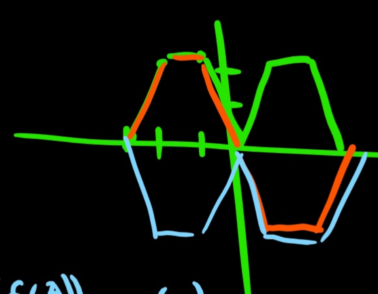
a) $f(25)$ is the number of items sold when price is \$25

b) $f^{-1}(30)$ is the price that gets 30 items sold.

15)



Since $f(-1) = 2$, $f^{-1}(2) = -1$



36)

x	$f(x)$	$g(x)$	$h(x) = g(f(x))$
-3	0	0	0
-2	2	2	-2
-1	2	2	-2
0	0	0	0
1	2	-2	-2
2	2	-2	-2
3	0	0	0

← $g(f(-3)) = g(0)$

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

← $g(f(1)) = g(2) = -2$