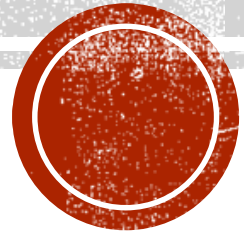
# COMPOSITIONS OF FUNCTIONS

Honors Calculus

Keeper 4



# COMPOSITION OF FUNCTIONS



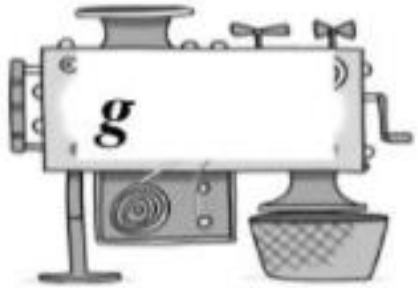
**Substituting** a function or it's value into **another** function.

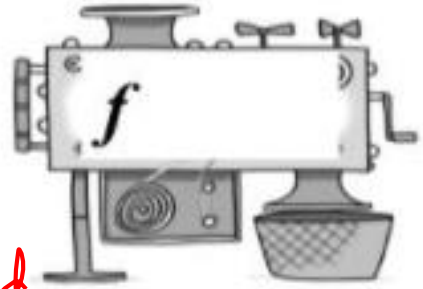
Second

$$f(g(x))$$

First

(inside parentheses always first)




OR

2nd 1st

$$f \circ g(x)$$

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

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

| x | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| f(x) | -3 | -2 | 1 | 4 | -1 | 0 |
| g(x) | -2 | 0 | 1 | 3 | -1 | 2 |

# Given the table, evaluate the following:

1. $f(-1)$ $= -2$ $(-1, -2)$
2. $g(2)$ $= -1$
3. $f(-3)$ DNE

| x | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| f(x) | -3 | -2 | 1 | 4 | -1 | 0 |
| g(x) | -2 | 0 | 1 | 3 | -1 | 2 |

# Given the table, evaluate the following:

means inverse
"what x will make g(x) = 0 ?"

4. $g^{-1}(0)$ $g(x) = 0$ $x = -1$

5. $f^{-1}(-2)$ $f(x) = -2$ $(?, -2)$ $x = -1$

| x | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| f(x) | -3 | -2 | 1 | 4 | -1 | 0 |
| g(x) | -2 | 0 | 1 | 3 | -1 | 2 |

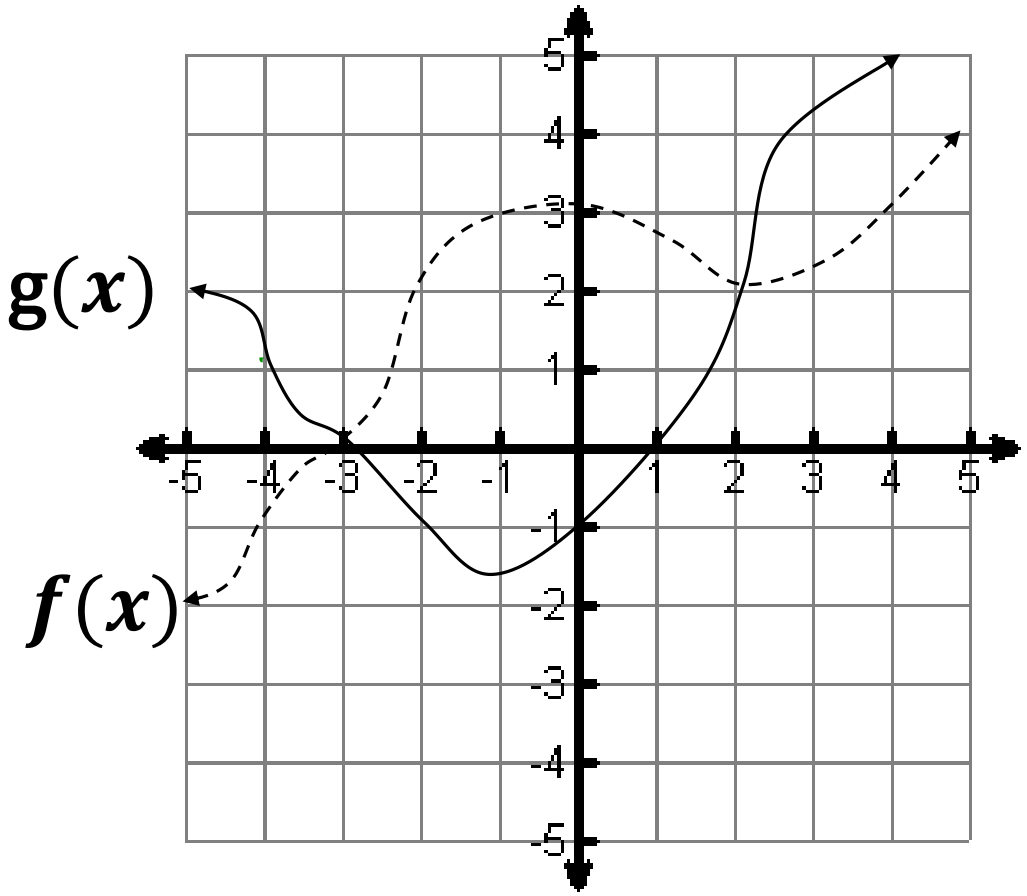
# Given the table, evaluate the following:

6. $f(g(-1))$ = inside 1st $f(0) = 1$

7. $(f \circ g)(3)$ out, inside 1st, $g(3)$ $f(2) = -1$

8. $(g \circ g)(1)$ or $g(g(1))$ $g(+1)$ $g(3) = 2$

# Given the graph of f(x) and g(x), evaluate the following:




1. $(f \circ g)(1)$ = $f(g(1))$ $f(0) = 3$

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

3. $(f \circ f)(-3)$ $f(f(-3))$ $f(0) = 3$

4. $(f \circ g)(-4)$ $f(1) = 3$ or $2\frac{2}{3}$

**Given** $f(x) = 3x^2 - 2x$, $g(x) = \ln x$, $h(x) = e^x$, *and* $j(x) = x + 4$, **evaluate:**

1. $f(j(x))$

outside inside

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

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

$3(x^2+8x+16) - 2x - 8 = 3x^2+24x+48 - 2x - 8$

$3x^2+22x+40$

2. $(g \circ h)(x) =$

out in

$\ln(e^x)$

$x \ln e = x$

3. $(h(j(g(x))))$

$j(g(x)) = \ln x + 4$

$h(\ln x + 4) = e^{\ln x + 4} = x + 4$