

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

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Periodic Graphs Day 9:

- Function Compositions

Homework: Function Compositions
(not due the next time I see you,
but already on Canvas in case you
want to practice now. But you are
allowed to enjoy break and not
think about functions for the next
ten days)

Example 1: Evaluating

$$f(x) = \sqrt{x}$$

$$h(x) = \frac{1}{x}$$

$$n(x) = x + 5$$

$$g(x) = \sqrt[3]{x}$$

$$m(x) = x^2$$

$$p(x) = x^2 - 10x + 25$$

A) $(n \circ g)(8)$

C) $(n \circ m)(0)$

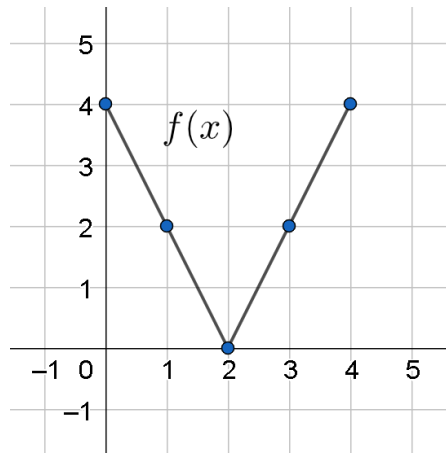
E) $(f \circ p)(4)$

B) $(f \circ n)(4)$

D) $(m \circ n)(0)$

F) $(p \circ f)(4)$

Example 2: Evaluating



x	$g(x)$
0	3
1	4
2	2
3	0
4	1

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

B) $(g \circ f)(0)$

C) $(f \circ f)(1)$

Example 3: Evaluating

$$f(x) = \sqrt{x}$$

$$h(x) = \frac{1}{x}$$

$$n(x) = x + 5$$

$$g(x) = \sqrt[3]{x}$$

$$m(x) = x^2$$

$$p(x) = x^2 - 10x + 25$$

A) $(f \circ n)(-4)$

C) $(n \circ h)(-5)$

E) $(n \circ h)(0)$

B) $(n \circ f)(-4)$

D) $(h \circ n)(-5)$

F) $(h \circ n)(0)$

Domain

The domain of $f(g(x))$ is restricted to the elements of the domain of g for which $g(x)$ is in the domain of f .

So:

- Pay attention to domain of inside function
- Inside function has to be in the domain of outside function

Let $f(x) = \sqrt{x}$ and let $g(x) = \frac{1}{x-3}$.

Find an expression for $(f \circ g)(x)$

Find the domain of $(f \circ g)(x)$

Example 4: Domain

So:

- Pay attention to domain of inside function
- Inside function has to be in the domain of outside function

Let $f(x) = \sqrt{x}$ and let $g(x) = \frac{1}{x-3}$.

Find an expression for $(g \circ f)(x)$

Find the domain of $(g \circ f)(x)$

Example 5: Domain

So:

- Pay attention to domain of inside function
- Inside function has to be in the domain of outside function

Let $f(x) = \sqrt{x}$ and let $g(x) = x^2 - 4$.

Find an expression for $(f \circ g)(x)$

Find an expression for $(g \circ f)(x)$

Find the domain of $(f \circ g)(x)$

Find the domain of $(g \circ f)(x)$

A special function for composing

$$\text{Let } f(x) = \sqrt{x + 2}$$

$$\text{Let } g(x) = x - 5$$

$$\text{Let } h(x) = x$$

Find an expression for...

A) $(f \circ h)(x)$

C) $(h \circ f)(x)$

B) $(g \circ h)(x)$

D) $(h \circ g)(x)$

A special function for composing

- When we combine things with addition, we call 0 the "additive identity" since $0 + x = x$ and $x + 0 = x$
- When we combine things with multiplication, we call 1 the "multiplicative identity" since $1 \cdot x = x$ and $x \cdot 1 = x$
- When we combine functions with composition, we call $f(x) = x$ the "identity function" since $f(g(x)) = g(x)$ and $g(f(x)) = g(x)$.