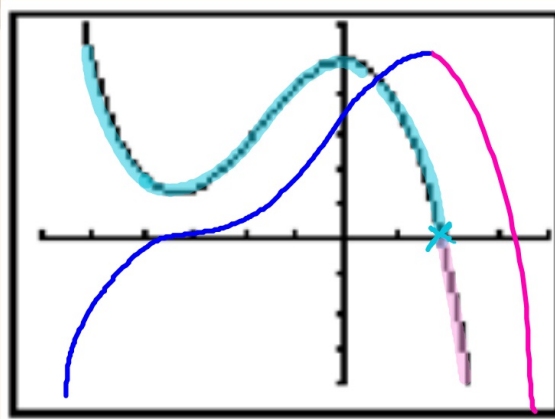


April 14

Below is a graph of the derivative. Explain how to sketch a graph of the function.



April 14

Students will verbally explain how to evaluate and create composite functions

(using the words: inside, outside, etc...)

$$f(g(x))$$

## Composite functions

### Notation

The combination of two or more functions, where the output of one function is the input for the other

$$f(g(x))$$

The output of  $g$  is the input for  $f$

$$g(f(x))$$

The output of  $f$  is the input for  $g$

If  $f(x) = x^2 - 3$   
and  $g(x) = 4x + 5$ ,  
Evaluate:

$$f(x) = x^2 - 3 \quad g(x) = 4x + 5$$

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

$$g(-2) = 4(-2) + 5 = -3 \quad f(-3) = (-3)^2 - 3 = 6$$

$$f(g(-2)) = f(-3) = (-3)^2 - 3 = 6$$

$$g(f(4))$$

$$f(4) = 4^2 - 3 = 13$$

$$g(f(4)) = g(13) = 4(13) + 5 = 57$$

If  $f(x) = x^2 - 3$   
and  $g(x) = 4x + 5$ ,

find

$$f(g(x))$$

$$f(4x+5) = (4x+5)^2 - 3$$

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

$$h(x) = \sqrt{x+2}$$

$$g(x) = e^{2x-3}$$

$$m(x) = \cos(x) + x$$

1.  $f(g(2)) = 13.8256$

2.  $g(m(-4)) = 4.518 \times 10^{-6}$

3.  $h(g(1)) = 1.538$

4.  $m(h(5)) = 1.7661$

5.  $m(f(h(7))) = 16.961$        $15.042$

6.  $h(g(f(-3))) =$

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

$$h(x) = \sqrt{x+2}$$

$$g(x) = e^{2x-3}$$

$$m(x) = \cos(x) + x$$

1.  $f(g(x))$

What is the "inside" function? \_\_\_\_\_

What is the "outside" function? \_\_\_\_\_

2.  $m(g(x)) = \cos(e^{2x-3}) + e^{2x-3}$

What is the "inside" function?  $g(x) = e^{2x-3}$  \_\_\_\_\_

What is the "outside" function?  $m(x) = \cos(x) + x$  \_\_\_\_\_

3.  $h(f(x))$

What is the "inside" function? \_\_\_\_\_

What is the "outside" function? \_\_\_\_\_

4.  $m(h(x))$

What is the "inside" function? \_\_\_\_\_

Find a possible "inside" and "outside" function for each of the functions below:

1.  $\sqrt{4x^2 - 5x}$       inside:  $4x^2 - 5x$       outside:  $\sqrt{x}$
2.  $\frac{5}{x - x^3}$       inside:  $x - x^3$       outside:  ~~$5x$~~
3.  $\cos(e^x)$       inside: \_\_\_\_\_      outside: \_\_\_\_\_
4.  $(6x - 8)^5$       inside:  $6x - 8$       outside:  $x^5$        $(x)^5$

5. Find three functions for:

$(\sin(5x))^4$

inside: \_\_\_\_\_

$5x$

middle: \_\_\_\_\_

$\sin(x)$

outside: \_\_\_\_\_

$x^4$

6. Find three functions for:

$\ln((\tan x)^{-3})$

inside: \_\_\_\_\_

$\tan x$

middle: \_\_\_\_\_

$x^{-3}$

outside: \_\_\_\_\_

$\ln(x)$

$\tan(x^{-3})$