

Name: \_\_\_\_\_

Show work needed to justify your answer.

Date: \_\_\_\_\_

HW: # 5: Math IBSL - Standard 5 - Composition of Functions

5 points

1 a Given the functions

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

$$g(x) = 4x - 2$$

$$h(x) = \sqrt{x} + 1$$

find:

iii  $f(h(x))$

$$f(\sqrt{x}+1)$$

$$\boxed{- (\sqrt{x}+1)^2 + 5(\sqrt{x}+1)}$$

or  $-(x+2\sqrt{x}+1) + 5\sqrt{x}+5$

$$\boxed{f(h(x)) = -x + 3\sqrt{x} + 4}$$

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

$$g(\sqrt{x}+1)$$

$$4(\sqrt{x}+1) - 2$$

$$\boxed{g(h(x)) = 4\sqrt{x} + 2}$$

v  $(f \circ f \circ f)(-1)$

$$f(f(-6))$$

$$f(-66)$$

$$\boxed{-4686}$$

vii  $(g \circ f)(2) + (f \circ g)(2)$

$$g(6) + f(6)$$

$$22 + (-6)$$

$$\boxed{16}$$

2 Create two different functions,  $f(x)$  and  $g(x)$ , **Answers Vary** such that

- a  $f(g(x)) = g(f(x)) \rightarrow$  **MUST be inverses**
- b  $f(g(x)) \neq g(f(x)) \rightarrow$  **NOT inverses**
- c  $f(2) = g(2)$

Examples

(a)  $f(x) = 2x + 1$   
 $g(x) = \frac{x-1}{2}$

(b)  $f(x) = 3x + 5$   
 $g(x) = 2x - 1$

(c)  $f(x) = 3x$   
 $g(x) = 2x + 2$

$$\left\{ \begin{array}{l} 3(2) = 6 \\ 2(2) = 4 \end{array} \right.$$

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3 Given  $f(x) = -2x + 5$  and  $g(x) = 4x - 1$ :a find an expression for  $f(g(x))$ b solve  $f(g(x)) = 12$ .

$$a) f(g(x)) = f(4x-1) \rightarrow -2(4x-1)+5 \rightarrow -8x+2+5$$

$$\boxed{f(g(x)) = -8x+7}$$

$$b) 12 = -8x+7$$

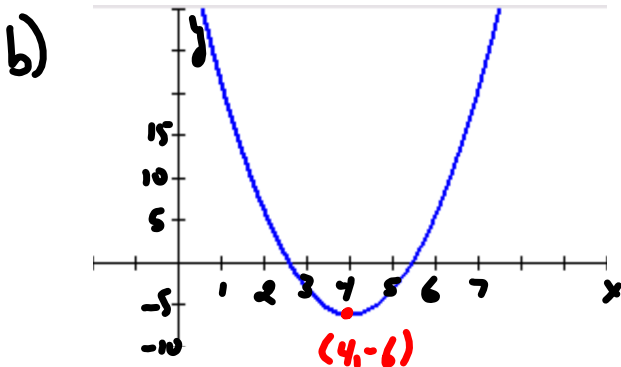
$$5 = -8x$$

$$\boxed{x = -\frac{5}{8}}$$

4 Given  $f(x) = 3x^2 - 6$  and  $g(x) = -x + 4$ :a find  $f(g(x))$ b using your GDC, sketch the graph of  $f(g(x))$ c state the domain and range of  $f(g(x))$ 

$$a) f(g(x)) = f(-x+4) = 3(-x+4)^2 - 6 = 3(x^2 - 8x + 16) - 6$$

$$\boxed{f(g(x)) = 3x^2 - 24x + 42}$$



$$c) D: (-\infty, \infty)$$

$$R: [-6, \infty)$$