

# WS #4 Solutions

Math 109 College Algebra  
Lecturer: Calvin Hotchkiss  
Group Worksheet 4

Fall 2024  
TA: Samir Donmazov

Indicate which group member is taking on which of the following four roles. You will switch roles on the next recitation day.

- Reader: Reads the problem to the group and makes sure everyone understands.
- Spokesperson: presents the work and asks questions to the TA.
- Recorder: writes everyone's names and the group's work on the worksheet.
- Timekeeper: keeps track of time.

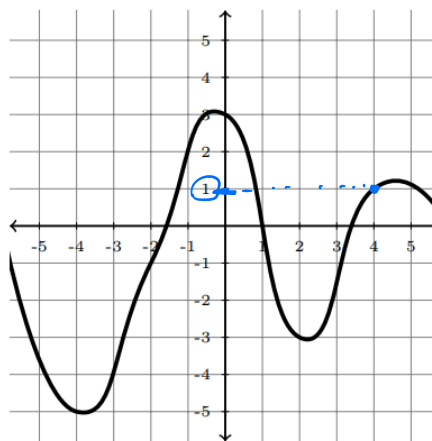
Reader's name: \_\_\_\_\_

Spokesperson's name: \_\_\_\_\_

Recorder's name: \_\_\_\_\_

Timekeeper's name: \_\_\_\_\_

(1) Suppose  $f(x)$  is given by the graph to the right and  $g(x) = x^2 - 4x + 4$ .



(a) What is  $g(f(4))$ ?  $= g(\underbrace{1}_{=1}) = 1$

$$g(1) = 1^2 - 4 \cdot 1 + 4 = 1 - 4 + 4 = 1$$

(b) What is  $f(g(0))$ ?  $= f(\underbrace{4}_{=4}) = 1$

$$g(0) = 0^2 - 4 \cdot 0 + 4 = 4$$

(2) Let  $f(x)$  and  $g(x)$  be as above and let  $h(x)$  be defined by the table to the right.

(a) What is  $g(h(f(1)))$ ?  $= g(\underbrace{h(0)}_{=5}) = g(5) = 9$

$$g(5) = 5^2 - 4 \cdot 5 + 4 = 25 - 20 + 4 = 9$$

(b) What is  $2h(3) - f(g(2))$ ?  $= 2 \cdot \underbrace{4}_{=4} - \underbrace{f(0)}_{=3} = 5$

x	h(x)
-1	8
0	5
1	-1
2	2
3	4
4	8

$$g(2) = 2^2 - 4 \cdot 2 + 4 = 4 - 8 + 4 = 0$$

(3) Let  $f(x) = x - 6$  and  $g(x) = 3x^2 + 4x + 5$ . Write the formulas for the following. **Do not simplify.**

$$(a) f(g(x)) = (3x^2 + 4x + 5) - 6$$

$$(b) g(f(x)) = 3(x-6)^2 + 4(x-6) + 5$$

$$(c) f(f(x)) = (x-6) - 6$$

(4) Let  $f(x) = 3x + 1$  and  $g(x) = \frac{x-1}{3}$ . Evaluate **and simplify**:

$$(a) f(g(x)) = \cancel{3} \cdot \frac{x-1}{\cancel{3}} + 1 = x - 1 + 1 = x$$

$$(b) g(f(x)) = \frac{(3x+1) - 1}{3} = \frac{\cancel{3}x}{\cancel{3}} = x$$

(c) What do you notice?

$$f(g(x)) = g(f(x)) = x$$