Math 418 Worksheet 7

October 21, 2020

1 Suppose f and g are defined by the following tables.

x	$f(x)$
2	8
3	11
4	13
5	1

x	$g(x)$
1	2
2	4
3	4
4	5

a) A number of students are trying to evaluate $(f \circ g)(2)$. Joe claims$(f \circ g)(2) = 4$. Amanda claims that $f \circ g$ isn't defined at 2. Tommy claims $(f \circ g)(2) = 32$. Janelle claims $(f \circ g)(2) = 13$. Who is correct?

b) Tommy followed the following line of logic: $(f \circ g)(2) = f(2) \times g(2) = 8 \times 4 = 32$. Where is the flaw in this logic?

c) What are the domains of $g \circ f$ and $f \circ g$?

2 Tammy A and Johan B are having a heated (mathematical) disagreement. Tammy believes that if you compose two polynomials you will always get a polynomial. Johan isn't so sure and believes that it is possible for you to pick two polynomials and compose them so that the composition is NOT a polynomial. Who is right? Who is wrong? Fully explain your answer.

3 Is it possible to compose two rational functions and get a polynomial? If so give an example of two such rational functions. If not, explain why it is impossible.

4 Give an example of a function $h(x)$ so that the graph of $y = (h \circ f)(x)$ is the graph of f but shifted down 3 units and vertically flipped and vertically stretched by a factor of $\frac{1}{2}$.

5 Find the inverse and range of $f(x) = \frac{2x-1}{3-x}$

6 Suppose you have two invertible functions, $f(x)$ and $g(x)$ such that $f \circ g$ is invertible. Find an expression for $(f \circ g)^{-1}$ in terms of f^{-1} and g^{-1}.

7 Suppose $f(x) = x + 1$. Find an expression for $(f \circ f \circ f \circ f)(x)$.

8 Suppose $f(x) = x + 1$ and $n > 0$ is an integer. Find an expression for $(f \circ f \circ \cdots \circ f \circ f)(x)$, where there are n f's being composed.

9 Suppose $f(x) = \frac{1}{x}$ and $n > 0$ is an integer. Find an expression for $(f \circ f \circ \cdots \circ f \circ f)(x)$, where there are n f's being composed.