

Student ID: your Student ID Here

Assignment # 01

MTH101 (Fall 2022)

Marks: 10

Due Date: 02-12-2022

Question # 1:

If $f(x) = |x|$ and $g(x) = \frac{\sqrt{x}}{x}$

- I. Determine whether $f \circ g(x) = g \circ f(x)$ or not.
- II. Find the domain of $f \circ g(x)$ and $g \circ f(x)$.

Solution:

$$f(x) = |x| \text{ and } g(x) = \frac{\sqrt{x}}{x}$$

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

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

$$f \circ g(x) = f\left(\frac{\sqrt{x}}{x}\right)$$

$$f \circ g(x) = \left| \frac{\sqrt{x}}{x} \right|$$

$$f \circ g = \left| \frac{\sqrt{x}}{\sqrt{x^2}} \right|$$

$$f \circ g(x) = \left| \frac{\sqrt{x}}{\sqrt{x}\sqrt{x}} \right|$$

$$f \circ g(x) = \left| \frac{1}{\sqrt{x}} \right|$$

now:

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

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

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

$$g \circ f(x) = \frac{\sqrt{|x|}}{|x|}$$

$$g \circ f(x) = \frac{\sqrt{|x|}}{\sqrt{|x|} \cdot \sqrt{|x|}}$$

$$g \circ f(x) = \frac{1}{\sqrt{|x|}}$$

hence proved

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

Part 2:

$$\text{domain of } f \circ g(x) = (0, \infty)$$

$$\text{domain of } g \circ f(x) = (-\infty, 0) \cup (0, \infty)$$