

Exercise 311

True or False? Justify your answer with a proof or a counterexample.

$$f \circ g = g \circ f, \text{ assuming } f \text{ and } g \text{ are functions.}$$

Solution

This is false. Consider, for example,

$$f(x) = x^2 \quad \text{and} \quad g(x) = 3x.$$

Then

$$f \circ g = f(g(x)) = f(3x) = (3x)^2 = 9x^2$$

$$g \circ f = g(f(x)) = g(x^2) = 3(x^2) = 3x^2,$$

so $f \circ g \neq g \circ f$.