

Example: Let $f(x)=x^2+3$ and $g(x)=\sqrt{x}$ find:

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

$$1. f \circ g(x) = f(g(x))$$

$$= f(\sqrt{x})$$

$$= (\sqrt{x})^2 + 3$$

$$= x + 3$$

$$2. g \circ f(x) = g(f(x))$$

$$= g(x^2 + 3)$$

$$= \sqrt{x^2 + 3}$$

$$3. f \circ f(x) = f(f(x))$$

$$= f(x^2 + 3)$$

$$= (x^2 + 3)^2 + 3$$

$$4. g \circ g(x) = g(g(x))$$

$$= g(\sqrt{x})$$

$$= \sqrt{\sqrt{x}} = \sqrt[4]{x}$$

Homework: Find $f \circ g(x)$, $g \circ f(x)$, $f \circ f(x)$, $g \circ g(x)$ to
these functions, $f(x)=x^2+1$, $g(x)=x^3$