

Note: Answers are not guaranteed to be correct! Decompose the following functions into simpler ones:

$$f(x) = \sqrt{x}, g(x) = 2x + 1$$

$$(f \circ g)(x) = \sqrt{2x + 1}$$

$$f(x) = x^2 + 1, g(x) = 1 - x$$

$$\left(\frac{f}{g}\right)(x) = \frac{x^2+1}{1-x}$$

$$f(x) = 1 - 2x^3, g(x) = e^x$$

$$(fg)(x) = (1 - 2x^3)e^x$$

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

$$f(g(x)) = \sin(3x^2)$$

$$f(x) = \sqrt{x}, g(x) = 1 - x^2,$$

$$h(x) = \sin(x)$$

$$\frac{f(g(x))}{h(x)} = \frac{\sqrt{1-x^2}}{\sin(x)}$$

$$f(x) = \cos(x), g(x) = x + 1,$$

$$h(x) = x - 1$$

$$f\left(\frac{g(x)}{h(x)}\right) = \cos\left(\frac{x+1}{x-1}\right)$$

$$f(x) = e^x, g(x) = 15x^{17} + 1,$$

$$h(x) = 3x^2 + \tan x$$

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

$$e^{5x^{17}+1}(3x^2 + \tan x)$$

$$f(x) = \cos(x), g(x) = \sqrt{x}$$

$$h(x) = 4 - 7x^2$$

$$f(g(h(x))) = \cos(\sqrt{4 - 7x^2})$$

- Find all values of θ in $[0, 2\pi]$ that satisfy the equation $\sin \theta = \frac{\sqrt{3}}{2}$. $\theta = \pi/3, 2\pi/3$
- Find all values of x in $[0, \pi]$ that satisfy the equation $\sin^2 2x =$

$$\frac{3}{4}. \quad x = \pi/6, \pi/3, 2\pi/3, 5\pi/6$$

- Let $f(x) = \sqrt{2x + 1}$ and $g(x) = \frac{x+2}{x-1}$. Find $f + g$, $f \cdot g$, $f \circ g$, $g \circ f$, and their respective domains.

$$(f + g)(x) = \sqrt{2x + 1} + \frac{x + 2}{x - 1} \quad D_{f+g} : x \geq -1/2, x \neq 1$$

$$(f \cdot g)(x) = \left(\sqrt{2x + 1}\right) \frac{x + 2}{x - 1} \quad D_{f \cdot g} : x \geq -1/2, x \neq 1$$

$$(f \circ g)(x) = \sqrt{2 \left(\frac{x + 2}{x - 1}\right) + 1} \quad D_{f \circ g} : (-\infty, -1] \cup (1, \infty)$$

- Let $f(x) = \log_2(x - 1)$ and $g(x) = \sqrt{1 + x}$. Find $f + g$, $f \cdot g$, $f \circ g$, $g \circ f$, and their respective domains.