

Section 2.8

Solutions and Hints

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for the book:

Precalculus, Mathematics for Calculus 4th Edition
by James Stewart, Lothar Redlin and Saleem Watson.

34. Find $f(g(x))$, $g(f(x))$, $f(f(x))$ and $g(g(x))$ for: $f(x) = x^2$ and $g(x) = (x - 3)^{1/2}$

Notice the notation $f \circ g = f(g(x))$, $g \circ f = g(f(x))$, ...

$$f(g(x)) = f((x - 3)^{1/2}) = ((x - 3)^{1/2})^2 = x - 3$$

$$g(f(x)) = g(x^2) = (x^2 - 3)^{1/2} = \sqrt{x^2 - 3}$$

$$f(f(x)) = f(x^2) = (x^2)^2 = x^4$$

$$g(g(x)) = g((x - 3)^{1/2}) = ((x - 3)^{1/2} - 3)^{1/2} = \sqrt{\sqrt{x - 3} - 3}$$

42. Find $f \circ g \circ h = f(g(h(x)))$ for $f(x) = 1/x$, $g(x) = x^3$, $h(x) = x^2 + 2$

$$f(g(h(x))) = f(g(x^2 + 2)) = f((x^2 + 2)^3) = \mathbf{1 / (x^2 + 2)^3}.$$

48. Express $h(x) = 1 / (x + 3)$ in the form of $f \circ g$, where $f \neq g \neq h$.

Notice there are many ways to do this. Rarely will the professor ever accept an answer that says something like $f(x) = x$ and $g(x) = 1 / (x + 3)$.

A more viable answer is something like: **$f(x) = 1/x$ and $g(x) = x + 3$.**

Look for stuff that can easily be separated.