Calculus I

Section 1.3 Number 38

(This solution is on the syllabus but NOT in the provided solutions manual.)

Given

$f(x) = \sqrt{2x+3}$ $\qquad$ $g(x) = x^2 + 1$

Find $f \circ g$, $g \circ f$, $f \circ f$, and $g \circ g$.

$$f \circ g = f[g(x)] = \sqrt{2(x^2+1)+3} = \sqrt{2x^2+2+3} = \sqrt{2x^2+5}$$

$$g \circ f = g[f(x)] = \left(\sqrt{2x+3}\right)^2 + 1 = 2x+3+1 = 2x+4$$

$$f \circ f = f[f(x)] = \sqrt{2\left(\sqrt{2x+3}\right)+3}$$ (I am leaving this one in this form.)

$$g \circ g = g[g(x)] = \left(x^2+1\right)^2 + 1 = \left(x^4+2x^2+1\right)+1 = x^4+2x^2+2$$