

## Calculus I

### Section 1.3 Number 38

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

Given

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

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

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

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

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

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