Answer all questions to the best of your ability. Full credit will only be given if all work is shown and organized and it is clear what your answer is. The HW is out of 10 points.

- Section 6.1, page 407, problems: 11, 14, 17, 27, 28, 33, 44
- Section 6.2, page 417, problems: 19, 24, 39, 42, 44, 54

6.1.14 If \( f(x) = 2x^2 \) and \( g(x) = 1 - 3x^2 \)

(a) \((f \circ g)(4) = f(g(4)) = f(1 - 3(4)^2) = f(1 - 48) = f(-47) = 2(-47)^2 = 2(2709) = 4418.\)

(b) \((g \circ f)(2) = g(f(2)) = g(2(2^2)) = g(8) = 1 - 3(8)^2 = 1 - 3 \cdot 64 = 1 - 192 = -191.\)

(c) \((f \circ f)(1) = f(f(1)) = f(2) = 8.\)

(d) \((g \circ g)(0) = g(g(0)) = g(1) = 1 - 3 = -2.\)

1. Show that \((f \circ g)(x) = (g \circ f)(x) = x\) where \(f(x) = 2x - 6\) and \(g(x) = \frac{1}{2}(x + 6)\).

Solution: \((f \circ g)(x) = f(g(x)) = f\left(\frac{1}{2}(x + 6)\right) = 2\left(\frac{1}{2}(x + 6)\right) - 6 = (x + 6) - 6 = x.\)

\((g \circ f)(x) = g(2x - 6) = \frac{1}{2}(2x - 6 + 6) = \frac{1}{2} \cdot 2x = x.\)

2. Find two functions \(f\) and \(g\) such that \(f \circ g = \sqrt{1 - x^2}\)

Solutions: \(f(x) = \sqrt{1 - x}, g(x) = x^2,\) or \(f(x) = \sqrt{x}, g(x) = 1 - x^2.\)

3. Find the inverse of the 1-1 function \(f(x) = \frac{2x - 3}{x + 4}.\)

Solution: Let \(y = f(x) = \frac{2x - 3}{x + 4},\) switch the \(x\)'s and \(y\)'s and then solve for \(y.\)

\(x(y + 4) = 2y - 3 \Rightarrow xy + 4x = 2y - 3 \Rightarrow xy - 2y = -3 - 4x \Rightarrow (x - 2)y = -3 - 4x \Rightarrow y = \frac{-3 - 4x}{x - 2} = f^{-1}(x)\)