

1. Function Composition

- (a) $f(g(x)) = 3\sin^2(x)$, $g(f(x)) = \sin(3x^2)$
- (b) $f(g(x)) = 2^{3x-5}$, $g(f(x)) = 3(2^x) + 5$
- (c) $f(g(x)) = \cos(2x + 5)$, $g(f(x)) = 2\cos(x) + 5$
- (d) $f(g(x)) = \tan(2^x)$, $g(f(x)) = 2^{\tan(x)}$
- (e) $f(g(x)) = 2(5x - 2)^2 - 3(5x - 2) + 5$, $g(f(x)) = 5(2x^2 - 3x + 5) - 2$
- (f) $f(g(x)) = \frac{1}{\sqrt{x-6}}$, $g(f(x)) = \sqrt{\frac{1}{x} - 6}$
- (g) $f(g(x)) = \sqrt{(8x^2 - 6) + 2}$, $g(f(x)) = 8(\sqrt{x+2})^2 - 6 = 8|x+2| - 6$
- (h) $f(g(x)) = \sin\left(\frac{1}{\sqrt{x}}\right)$, $g(f(x)) = \frac{1}{\sqrt{\sin(x)}}$
- (i) $f(g(x)) = \frac{\sin(\cos(x))}{\cos(x)}$, $g(f(x)) = \cos\left(\frac{\sin(x)}{x}\right)$
- (j) $f(g(x)) = \cos(3x)$, $g(f(x)) = 3\cos(x)$

2. Find f and g (The answer is not unique)

- (a) $f(x) = x^3$, $g(x) = 8x^2 - 4$
- (b) $f(x) = \sqrt{x}$, $g(x) = 3x - 5$
- (c) $f(x) = \frac{x+1}{5-x}$, $g(x) = (x-2)^2$
- (d) $f(x) = \sin(x)$, $g(x) = 3x - 5$
- (e) $f(x) = \cos(x)$, $g(x) = 3x^2 - 5x + 1$
- (f) $f(x) = \sqrt{x}$, $g(x) = x^2 - 5$
- (g) $f(x) = \frac{1}{x}$, $g(x) = \cos(x)$
- (h) $f(x) = x^{15}$, $g(x) = 11x^2 - 6$
- (i) $f(x) = x^2 + 3x - 5$, $g(x) = 3x + 2$
- (j) $f(x) = 4x^2 - 3x + 5$, $g(x) = \sin(x)$
- (k) $f(x) = e^x$, $g(x) = -x^2 + 3x + 5$
- (l) $f(x) = \tan(x)$, $g(x) = \sin(x)$

3. Find f , g , h :

- (a) $f(x) = \sin(x)$, $g(x) = \sqrt{x}$, $h(x) = x - 5$
- (b) $f(x) = \frac{1}{x}$, $g(x) = \sqrt{x}$, $h(x) = 3x^2 - 7x + 5$
- (c) $f(x) = 3x^2 - 5$, $g(x) = 3x^2 - 5$, $h(x) = 3x^2 - 5$
- (d) $f(x) = \frac{3}{x}$, $g(x) = \sin(x)$, $h(x) = 4x^2 - 1$
- (e) $f(x) = \sqrt{x}$, $g(x) = \sqrt{x}$, $h(x) = \sqrt{x}$
- (f) $f(x) = \tan(x)$, $g(x) = 3x^2 + 5$, $h(x) = x - 2$