

Sec 1.4 Combination of Functions Part 1

Pg 116 #3, 9-15 odd, 35-41 odd

#3)  $f(x) = x^2, g(x) = 1-x$

a)  $(f+g)(x) = f(x) + g(x)$   
 $= x^2 + 1 - x$   
 $= \boxed{x^2 - x + 1}$

b)  $(f-g)(x) = f(x) - g(x)$   
 $= x^2 - (1-x)$   
 $= x^2 - 1 + x$   
 $= \boxed{x^2 + x - 1}$

c)  $(fg)(x) = f(x) \cdot g(x)$   
 $= x^2(1-x)$   
 $= \boxed{x^2 - x^3}$

d)  $(f/g)(x) = \frac{f(x)}{g(x)}$   
 $= \frac{x^2}{1-x}, x \neq 1$

e) Domain:  
 $\{x \in \mathbb{R} \mid x \neq 1\}$

For #9-15;  $f(x) = x^2 + 1, g(x) = x - 4$

#9)  $(f+g)(3) = f(3) + g(3)$   
 $= (3)^2 + 1 + (3) - 4$   
 $= 9 + 1 + 3 - 4$   
 $= \boxed{9}$

#11)  $(f-g)(0) = f(0) - g(0)$   
 $= (0)^2 + 1 - (0) - 4$   
 $= 0 + 1 - 0 - 4$   
 $= \boxed{5}$

#13)  $(fg)(4) = f(4) \cdot g(4)$   
 $= (4^2 + 1)(4 - 4)$   
 $= (16 + 1)(0)$   
 $= \boxed{0}$

#15)  $\left(\frac{f}{g}\right)(5) = \frac{f(5)}{g(5)} = \frac{5^2 + 1}{5 - 4}$   
 $= \frac{25 + 1}{1}$   
 $= \boxed{26}$

For #35-37; (a)  $f \circ g$  (b)  $g \circ f$

#35)  $f(x) = x^2, g(x) = x - 1$

a)  $f(g(x)) = f(x-1) = \boxed{(x-1)^2}$   
 $= 1$

b)  $g(f(x)) = g(x^2) = \boxed{x^2 - 1}$

#37)  $f(x) = 3x + 5, g(x) = 5 - x$

a)  $f(g(x)) = f(5-x) = 3(5-x) + 5$   
 $= 15 - 3x + 5$   
 $= \boxed{20 - 3x}$

b)  $g(f(x)) = g(3x+5) = 5 - (3x+5)$   
 $= 5 - 3x - 5$   
 $= \boxed{-3x}$

For #39-41 a) Find  $f \circ g$  &  $g \circ f$  and (b) Determine  $f \circ g = g \circ f$ .

#39)  $f(x) = \sqrt{x+4}, g(x) = x^2$

a)  $f(g(x)) = f(x^2) = \boxed{\sqrt{x^2+4}}$

$g(f(x)) = g(\sqrt{x+4}) = \frac{(\sqrt{x+4})^2}{x+4}, x \geq -4$   
 $= \boxed{x+4}$

b) They are not equal

#41)  $f(x) = \frac{1}{3}x - 3, g(x) = 3x + 1$

a)  $f(g(x)) = f(3x+1) = \frac{1}{3}(3x+1) - 3$   
 $= \frac{1}{3}(3x+1) - 3$   
 $= x + \frac{1}{3} - 3 = x - \frac{8}{3}$   
 $= \boxed{x - \frac{8}{3}}$

$g(f(x)) = g\left(\frac{1}{3}x - 3\right)$   
 $= 3\left(\frac{1}{3}x - 3\right) + 1$   
 $= x - 9 + 1$   
 $= \boxed{x - 8}$

b) they are not equal

