Algebra II

Ch. 6.6 – Operations with Functions

Name _____

Period ____ Date _____

Find the domain algebraically. Show the appropriate work.

1. $f(x) = 10x - 15$

$(-\infty, \infty)$

2. $g(x) = \sqrt{7x - 14}$

$7x - 14 \geq 0$
$7x \geq 14$
$x \geq 2$
$[2, \infty)$

3. $h(x) = \sqrt{5 - 12x}$

$5 - 12x \geq 0$
$-12x \geq -5$
$x \leq 5/12$
$(-\infty, 5/12]$

4. $j(x) = \dfrac{3x - 2}{8x + 3}$

$8x + 3 \neq 0$
$8x \neq -3$
$x \neq -3/8$
$(-\infty, -3/8) \cup (-3/8, \infty)$

Let $f(x) = 4x + 3$, $g(x) = 6x^2 - 3$, $h(x) = x^2 + 2x - 1$, and $k(x) = -x^2 - 3x$. Find the following and simplify.

5. $f + g$

$x + 3 + 6x^2 - 3$

$6x^2 + 4x$

6. $(g - h)(x)$

$6x^2 - 3 - (x^2 + 2x - 1)$
$6x^2 - 3 - x^2 - 2x + 1$
$5x^2 - 2x - 2$

7. $(f \cdot k)(x)$

$(4x + 3)(-x^2 - 3x)$
$-4x^3 - 12x^2 - 3x^2 - 9x$
$-4x^3 - 15x^2 - 9x$

8. $\left(\dfrac{h}{f}\right)(x)$ (state the restrictions)

$\dfrac{x^2 + 2x - 1}{4x + 3}$

$4x + 3 \neq 0$
$4x \neq -3$
$x \neq -3/4$

$(-\infty, -3/4) \cup (-3/4, \infty)$

9. $k - g$

$-x^2 - 3x - (6x^2 - 3)$
$-x^2 - 3x - 6x^2 + 3$
$-7x^2 - 3x + 3$

10. $g \cdot k$

$(6x^2 - 3)(-x^2 - 3x)$
$-6x^4 - 18x^3 + 3x^2 + 9x$

Let $f(x) = 5x + 1$, $g(x) = -2x^2 + 3$, $h(x) = 7 - 2x$ and $k(x) = 4$. Find the following and simplify.

11. $f \circ g$

$f(g(x))$
$f(-2x^2 + 3)$
$5(-2x^2 + 3) + 1$
$-10x^2 + 15 + 1$
$-10x^2 + 16$

12. $g \circ f$

$g(f(x))$ $-50x^2 - 20x + 1$
$g(5x + 1)$
$-2(5x + 1)^2 + 3$
$-2(25x^2 + 10x + 1) + 3$
$-50x^2 - 20x - 2 + 3$

13. $(k \circ g)(x)$

$k(g(x))$
$k(-2x^2 + 3)$

$\boxed{= 4}$

Mixed Answers: $\left(-\infty, \dfrac{5}{12}\right]$; $\left(-\infty, \dfrac{-3}{8}\right) \cup \left(\dfrac{-3}{8}, \infty\right)$; $\left(-\infty, -\dfrac{3}{4}\right) \cup \left(-\dfrac{3}{4}, \infty\right)$; $(-\infty, \infty)$; $[2, \infty)$; $6x^2 + 4x$; $-10x^2 + 16$;

4; $5x^2 - 2x - 2$; $-7x^2 - 3x + 3$; $-50x^2 - 20x + 1$; $-4x^3 - 15x^2 - 9x$; $-6x^4 - 18x^3 + 3x^2 + 9x$; $\dfrac{x^2 + 2x - 1}{4x + 3}$

Let $f(x) = 5x+1$, $g(x) = -2x^2+3$, $h(x) = 7-2x$ and $k(x) = 4$. Find the following and simplify.

14. $f(h(-2))$

$7-2(-2)$

$7+4 = 11$

$5(11)+1$

$\boxed{56}$

15. $h(g(3))$

$-2(3)^2+3$

$-18+3$

-15

$7-2(-15)$

$7+30$

37

16. $(g \circ f)(-2)$

$g(f(-2))$

$5(-2)+1$

$-10+1$

-9

$-2(-9)^2+3$

$-2(81)+3$

$-162+3 = -159$

17. $(g \circ g)(2)$

$g(g(2))$

$-2(2)^2+3$

$-8+3$

-5

$-2(-5)^2+3$

$-2(25)+3$

$-50+3$

-47

18. $f \circ f$

$f(f(x))$

$f(5x+1)$

$5(5x+1)+1$

$25x+5+1$

$25x+6$

19. $f \circ (h \circ g)$

$f(h(g(x)))$

$f(h(-2x^2+3))$

$f(7-2(-2x^2+3))$

$f(7+4x^2-6)$

$f(1+4x^2)$

$5(1+4x^2)+1$

$5+20x^2+1$

$20x^2+6$

Mixed Answers: -159; -47; 56; 37; $25x+6$; $20x^2+6$