SM3-A HANDOUT 6-2 (Combined Functions Algebraically) Multiplication by a number $f(x) = x^2 - 1$ 2f(x) = ? Replace "f(x)" with parentheses 2()Substitution step $\rightarrow f(x) = x^2 - 1$ $2f(x) = 2(x^2 - 1)$ Simplify \rightarrow $f(x) = x^2 - 1$ $2f(x) = 2x^2 - 2$

Perform the indicated operation:

$$f(x) = 4x + 2$$
 $g(x) = -5x + 3$
 $3f(x) = ?$
 $-2g(x) = ?$
 $5g(-3) = ?$

"Linear combinations of functions" $f(x) = 4x + 2 \qquad g(x) = -5x + 3$ (1) Replace with parentheses, (2) plug in, (3) Simplify. f(x) - g(x) = ? = () - () Perform the indicated operation: f(x) = 4x + 2 g(x) = -5x + 3(1) Replace with parentheses, (2) plug in, (3) Simplify. g(x) - 2 f(x) = () - 2() Perform the indicated operation: f(x) = 4x + 2 g(x) = -5x + 3(1) Replace with parentheses, (2) plug in, (3) Simplify. -3 f(x) - 2 g(x) = -3() - 2()

Perform the indicated operation:

$$f(x) = x^{2} + 4x - 21$$

$$g(x) = x - 3$$
(1) Replace with parentheses, (2) plug in, (3) Simplify.

$$f(x) \div g(x) = \frac{()}{()}$$

Perform the indicated operation:

$$f(x) = x^{2} - 5x - 14 \qquad g(x) = x + 3$$
(1) Replace with parentheses, (2) plug in, (3) Simplify.

$$g(x) \div 2 f(x) = \frac{()}{()}$$

 $\frac{New Notation}{f(x) - g(x)} = (f - g)(x)$ Rewrite the following in the new notation. g(x) - 2 f(x) -3 f(x) - 2 g(x) $f(x) \div g(x)$

Perform the indicated operation:

$$j(x) = 15x^2$$
 $k(x) = -5x^3$
 $(2j - 3k)(x)$
 $(2j - 3k)(-1)$
 $\left(\frac{2k}{j}\right)(x) = ?$

 $j(x) = 15x^{2} k(x) = -5x^{3}$ (j + k)(-2) What does this mean? (j + k)(x) = j(x) + k(x) = 15x^{2} - 5x^{3} $j(x) + k(x) = 15x^{2} - 5x^{3} OR, you can do it this way$ (j + k)(-2) = 15()² - 5()³ (j + k)(-2) = j(-2) + k(-2) = 15(-2)² - 5(-2)³ j(-2) + k(-2) = 15(-2)^{2} - 5(-2)^{3} = 60 + 40 = 60 + 40 = 100 = 100

Perform the indicated operation: $f(x) = x^2 + 4x - 21$ g(x) = x - 3(f - 2g)(-1) Combining Functions Algebraically <u>Product</u>: (fg)(x) = f(x) * g(x) f(x) = x + 2 g(x) = x - 2 (fg)(x) = (x + 2)(x - 2) $(fg)(x) = x^2 - 4$

$$f(x) = 3x \qquad g(x) = x - 4$$

$$(2f + 3g)(-1) = ?$$
Method 1: Write as two separate functions then combine the result
$$(2f + 3g)(-1) = 2f(-1) + 3g(-1)$$

$$= 2[3(-1)] + 3[(-1) - 4]$$

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

$$= -6 - 15$$

$$= -21$$

$$f(x) = 2x - 3 \qquad g(x) = 4x - 5$$

(3f + 2g)(-1) = ?
Method 2: Find linear combination of the functions THEN plug in.
(3f + 2g)(x) = 3(2x - 3) + 2(4x - 5)
= 6x - 9 + 8x - 10
= 14x - 19
(3f + 2g)(x) = 14x - 19
(3f + 2g)(-1) = 14(-1) - 19
= -14 - 19 = -33