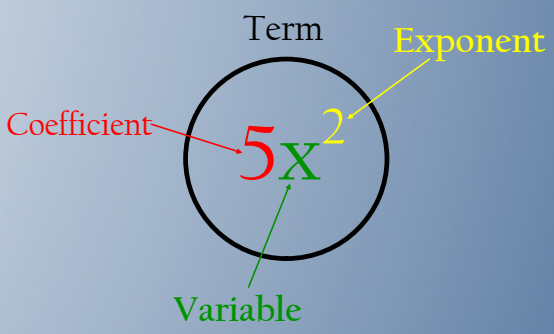
Operations with Polynomials
2.1/2

Terminology to remember...

Monomials

- A number or variable or the product of numbers and variables.
- NO addition or subtraction



Polynomials

- Groups of monomials added or subtracted from one another.
- Monomials are the terms of a polynomial.

$3x^2 - 2x + 1$ — Constant

Exponent Laws

Multiplying Powers
$x^m \cdot x^n = x^{m+n}$

$x^2 \cdot x^5 = x^7$

Power to a Power
$(x^m)^n = x^{m \cdot n}$

$(x^2)^7 = x^{28}$

Power of a Quotient
$\left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}$

$\left(\frac{3x}{2}\right)^2 = \frac{(3x)^2}{2^2} = \frac{9x^2}{4}$

Dividing Powers
$x^m \div x^n = x^{m-n}$

$x^7 \div x^4 = x^3$

$\frac{x^m}{x^n} = x^{m-n}$

$\frac{x^3}{x^1}$

Zero Exponent
$m = n$

$\frac{x^n}{x^n} = 1 = x^{n-n} = x^0$

$\frac{2^3}{2^3} = 1 = 2^{3-3} = 2^0$

ver of a Product
$(x \cdot y)^m = x^m \cdot y^m$

$(2x)^3 = 2^3 x^3 = 8x^3$

Negative Exponent
$x^{-m} = \frac{1}{x^m}$

$x^{-2} = \frac{1}{x^2}$

Distributive Property

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

$6x^3 + 15x^2$

·	$2x$	$+5$
$3x^2$	$+6x^3$	$+15x^2$

$(+2x^2 - 1x + 4)(+4x^2 + 2x - 3)$

$8x^4 + 8x^2 + 11x - 12$

	$+2x^2$	$-1x$	$+4$
$4x^2$	$8x^4$	$-4x^3$	$16x^2$
$+2x$	$4x^3$	$-2x^2$	$8x$
-3	$-6x^2$	$+3x$	-12

Commutative Property

$2x(3x^2 - 1)(x)$

commute

- to move around
- order doesn't matter for addition and multiplication

$(2x)(2x + 1) = (2x + 1)(2x)$

$3a + 6b + 4a = 3a + 4a + 6b$

$6 + 17 + 4$

$5 \times 13 \times 2$

Associative Property

how you group terms doesn't matter

$$a + (b + c) = (a + b) + c$$

$$a(bc) = (ab)c$$

$(17 + 6) + 4$

Equivalent Expressions

2 functions are equivalent if...

- they simplify to the same function and
- they produce the same graph

Checking 1 or 2 values is not enough to show equivalence.

You may pick the intercepts

This is enough to show non-equivalence though!

$y = -x(x + 20)$

$-x^2 + 20x$

$y = -1(x-10)^2 + 100$

$y = -1(x-10)(x+10) + 100$

$= -1(x^2 - 20x + 100) + 100$

$= -x^2 + 20x$

Examples

1)Simplify

$(-4x^2 - 2xy) + (6x^2 - 3xy + 2y^2)$

$2x^2 - 5xy + 2y^2$

$(3x^2 + 2y^2 + 7) - (4x^2 - 2y^2 - 9)$

$-x^2 + 4y^2 + 16$

Example 2

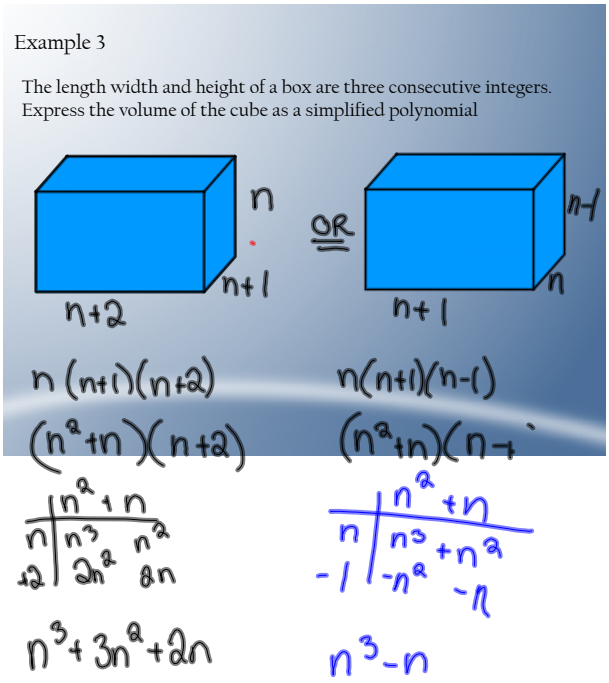
Given $h(t) = -5t^2 + 5t + 2.5$ and $v(t) = -10t + 5$ find $h(t)v(t)$

x	$-5t^2$	$+5t$	$+2.5$
$-10t$	$+50t^3$	$-50t^2$	$-25t$
$+5$	$-25t^2$	$+25t$	12.5

$= 50t^3 - 75t^2 + 125$

Example 3

The length width and height of a box are three consecutive integers. Express the volume of the cube as a simplified polynomial



Why did I get 2 different Results??

what does n represent in each?

Assign: p. 88 #6, 8, 10 , 11, 12 , 13
p. 95 # 5, 6, 9, 10 , 11, 13