Déjà Vu, It's Algebra 2!

Lesson 14

Polynomials: Addition, Subtraction, & Multiplication

A polynomial is an expression that consists of adding or subtracting a combination of numbers and variables. The variables have exponents that are non-negative integers.

$$4x^5 - 7x^3 + \frac{2}{3}x^2 - \sqrt{3}$$

The degree of a polynomial is the largest exponent.

The coefficients of a polynomial are numbers in front of the variables.

The leading coefficient is the number in front of the variable with the largest exponent.

We classify polynomials in several ways:

By number of terms

Name	# of terms	Example
Monomial		$4x$ or -7 or x^2
Binomial		$4x-1$ or x^2+2
Trinomial		x^2+2x-1 Or $4x^5+2x^3-3x$
Polynomial		$-6x^6+x^2+1+8x^4-9x^8$

By degree

Name	degree	Example
Constant		-8
Linear		$-6x-2$
Quadratic		$3x^2+2x$
Cubic		x^3
Quartic		$-x^4-x+1$
Quintic		$6x^5+4x^3+2x^2-x$

When adding or subtracting polynomials, we add like terms (those with the same variables.) We can do this vertically or horizontally.

Example:

If $f(x) = 4x^3 - 2x^2 - 5x - 4$ and

$g(x) = x^4 + 3x^2 + x - 2$

Find the following . . .

a) $f(x) + g(x)$

b) $g(x) - f(x)$

c) $2f(x) - 3g(x)$

We can also multiply polynomials.

Example:

$$\left(2x^2+2\right)\left(x-4\right)$$

Let $n(x)=2x-4$ be the number of magic math pills produced by a company at an average cost of $a(x)=-3x^3-5x^2+x$ dollars per pill, where x is the number of years since 2000. Create a function, $c(x)$, for how much money has been spent on producing these pills as a function of time, x.

When a polynomial is raised to a higher power, we can expand it by a routine, repetitive process. We call this Binomial Expansion.

Example:

Expand $(2x-1)^3$

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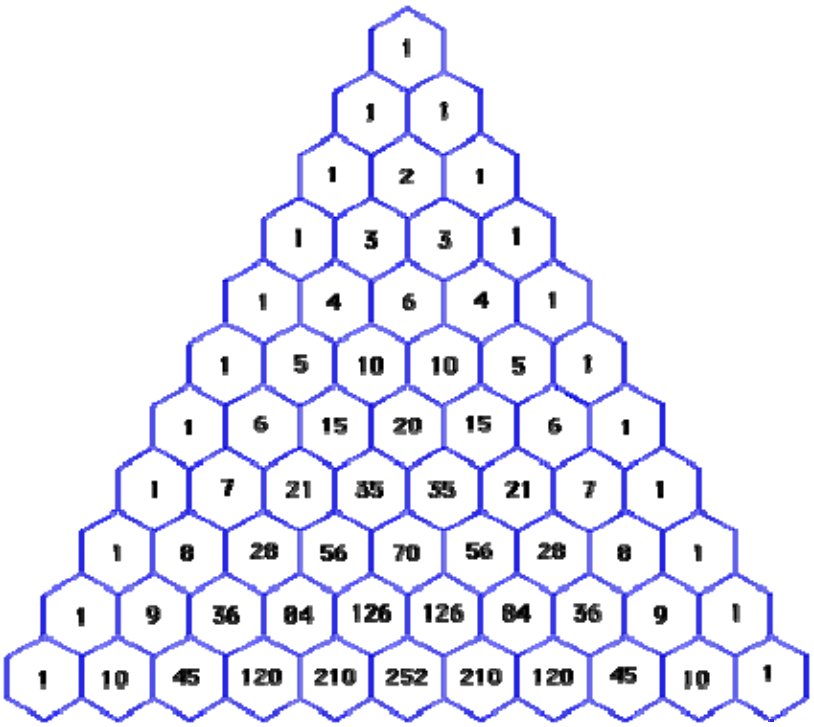
For any binomial of the form $(a+b)^n$, we can expand using a more efficient method:

Pascal's Triangle



Expression	Expansion	Triangle coeffs
$(a+b)^0$	1	1
$(a+b)^1$	$a+b$	1 1
$(a+b)^2$	$a^2+2ab+b^2$	1 2 1
$(a+b)^3$	$a^3+3a^2b+3ab^2+b^3$	1 3 3 1
$(a+b)^4$	$a^4+4a^3b+6a^2b^2+4ab^3+b^4$	1 4 6 4 1

Example:

Expand $(x-2)^4$

References:
All images TI-83+ calculator

http://mathforum.org/workshops/usi/pascal/images/pascal.hex2.gif
http://www.biografiasyvidas.com/biografia/p/fotos/pascal.jpg
http://go.hrw.com/gopages/ma/alg2_07.html