Row 0 → 1
Row 1 → 1 1
Row 2 → 1 2 1
Row 3 → 1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1

The Row Number in Pascal's Triangle is the 2nd Number in each row.

Do you see a connection to Pascal's Triangle and the results of expanding powers of (a + b) ?

$$(a+b)^0 = 1 \longrightarrow 1$$
$$(a+b)^1 = a+b \longrightarrow 1a + 1b$$
$$(a+b)^2 = a^2 + 2ab + b^2 \longrightarrow 1a^2 + 2ab + 1b^2$$
$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3 \longrightarrow 1a^3 + 3a^2b + 3ab^2 + 1b^3$$

The coefficients of each term are the numbers in the row of Pascal's Triangle that to corresponds to the exponent of (a + b).

Do you notice a pattern in the exponents?

$$(a+b)^0 = 1$$
$$(a+b)^1 = a+b$$
$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$
$$(a+b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$$

Powers of a decrease from left to right
Powers of b decrease from right to left

For each term the powers of a and b add to the exponent of (a + b)

What do you notice about how many terms each has?

$$(a+b)^0 = 1$$
$$(a+b)^1 = a+b$$
$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$
$$(a+b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$$

The number of terms is one more then the power on (a + b).

Expand this: $(c + d)^6$ ← Row 6 → 7 spaces

$1c^6 + 6c^5d + 15c^4d^2 + 20c^3d^3 + 15c^2d^4 + 6cd^5 + 1d^6$

Do you notice a pattern with the signs?

$$(a-b)^6 = a^6 - 6a^5b + 15a^4b^2 - 20a^3b^3 + 15a^2b^4 - 6ab^5 + b^6$$

$$(a-b)^7 = a^7 - 7a^6b + 21a^5b^2 - 35a^4b^3 + 35a^3b^4 - 21a^2b^5 + 7ab^6 - b^7$$

when there is a minus in the middle of the binomial, the signs of the terms alternate. If a is positive then the first term is positive and the second term becomes negative.

If $(a+b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$

How would this expansion be different? $(a - b)^4$

$$(a - b)^4 = (a + -b)^4 = a^4 + 4a^3(-b) + 6a^2(-b)^2 + 4a(-b)^3 + (-b)^4$$

$$= \boxed{a^4 - 4a^3b + 6a^2b^2 - 4ab^3 + b^4}$$

$(a - b)^4 = (a + -b)^4 = a^4 + 4a^3(-b) + 6a^2($

How would the results of these two be different?

$(a - b)^5$

This would start with a^5

The second term would be negative and alternate after that.

$(-a + b)^5$

This would start with $(-a)^5 = -a^5$

The second term would be positive and alternate after that.

How would the results of these two be different?

$(a - b)^4$

This would start with a^4

The second term would be negative and alternate after that.

$(-a + b)^4$

This would start with $(-a)^4 = a^4$ thus it is still positive.

The second term would be negative and alternate after that.

Expand this: $(Q - R)^7$

Row 7 of Pascal's Triangle: 1 7 21 35 35 21 7 1

$1Q^7 - 7Q^6R + 21Q^5R^2 - 35Q^4R^3 + 35Q^3R^4 - 21Q^2R^5 + 7QR^6 - 1R^7$

Expand and simplify. Write answer in Standard Form.

$(x + 2)^4$

$x^4 + 4x^3 2 + 6x^2 2^2 + 4x 2^3 + 2^4$

$= x^4 + 8x^3 + 24x^2 + 32x + 16$

Expand and simplify. Write answer in Standard Form.

$(2x - 3)^5$

$(2x)^5 - 5(2x)^4 3 + 10(2x)^3 3^2 - 10(2x)^2 3^3 + 5(2x) 3^4 - 3^5$

$32x - 240x^4 + 720x^3 - 1080x^2 + 810x - 243$

Expand and simplify. Write answer in Standard Form.

$(4x - 5y)^4$

$$(4x)^4 - 4(4x)^3(5y) + 6(4x)^2(5y)^2 - 4(4x)(5y)^3 + (5y)^4$$

$$256x^4 - 1280x^3y + 2400x^2y^2 - 2000xy^3 + 625y^4$$

Find the 10th term of $(5 - g)^9$

↳ Row 9 has 10 terms which means the 10th term is the last one ∴ the last # in Row 9 is 1.

$$-1(5)^0(g)^9$$

$$= \boxed{-g^9}$$

Find the 5th term of $(A - 3)^{11}$

Row 11

1 11 55 165 330

$$+A^{11} - A^{10}(3)^1 + A^9(3)^2 - A^8(3)^3 + A^7(3)^4$$

$$+330A^7(3)^4$$

$$\boxed{+26730A^7}$$

Find the 6th term of $(3g - 2)^{10}$

6TH Term

Row 10

1 10 45 120 210 252 ...

$$+(3g)^{10}(2)^0 - (3g)^9(2)^1 + (3g)^8(2)^2 - (3g)^7(2)^3 + (3g)^6(2)^4 - (3g)^5(2)^5$$

$$-(252)(3g)^5(2)^5$$

$$= \boxed{-1,959,552g^5}$$

You can now finish Hwk #34 Sec 6-8

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Problems 24, 34, 36, 38, 48, 54