Binomial Expansion Theorem

$(x+y)^0 = 1$

$(x+y)^1 = 1x + 1y$

$(x+y)^2 = 1x^2 + 2xy + 1y^2$

$(x+y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$

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

Pascal's Δ

Row 0	1					
1	1	1				
2	1	2	1			
3	1	3	3	1		
4	1	4	6	4	1	
5	1	5	10	10	5	1
	${}_5C_0$	${}_5C_1$	${}_5C_2$	${}_5C_3$	${}_5C_4$	${}_5C_5$

$\frac{5!}{3!2!}$ $\frac{5!}{2!3!}$

Purpose: to take a binomial to a power without foiling many times.

$(3x-2y)^4 = 1(3x)^4(-2y)^0 + 4(3x)^3(-2y)^1 + 6(3x)^2(-2y)^2 + 4(3x)^1(-2y)^3 + 1(3x)^0(-2y)^4$

$3^4 \qquad 4\cdot 3^3\cdot(-2)^1 \qquad 6\cdot 3^2\cdot(-2)^2 \qquad 4\cdot 3\cdot -2^3 \qquad (-2)^4$

$81x^4 - 216x^3y^1 + 216x^2y^2 - 96xy^3 + 16y^4$

1st 2nd 3rd 4th

Find the 4th term of $(3x-2y)^4$.

$${}_4C_3(3x)^1(-2y)^3 = 96xy^3$$

$${}_4C_3\cdot 3^1\cdot(-2)^3$$

Find the 7th term of $(5x-4y)^{10}$.

$${}_{10}C_6(5x)^4(-4y)^6$$

$$= 537{,}600{,}000\,x^4y^6$$

BINOMIAL PROBABILITY

1) 2 possible outcomes
2) Independent events $\Rightarrow$ same chance every time the action is performed.

Kirby Kicker – makes 65% of field goals under 40 yds.

What is the probability he will make exactly 5 of his next 7 attempts?

$$= {}_7C_2 H^5 M^2$$

$$= {}_7C_2 (0.65)^5 (0.35)^2$$

$$\approx 0.298$$

$$\begin{array}{r} 100^\circ \\ -\,65^\circ \\ \hline 35^\circ \end{array}$$

10 Questions – Multiple Choice
A, B, C, D

What is prob. exactly 8 right?

$${}_{10}C_2 R^8 W^2$$

$${}_{10}C_2 \left(\frac{1}{4}\right)^8 \left(\frac{3}{4}\right)^2 = 0.000386$$

0.25