Pre-Calculus 12 Binomial Theorem Continued

General Term

$\boxed{t_{k+1} = {}_nC_k x^{n-k} y^k}$

$t_{k+1} = {}_nC_k a^{n-k} b^k$

$(x+y)$

$(x+(-2))$

Ex. 1) Determine the 9th term of $(x-2)^{10}$

$k+1$
$8+1 = 9^{th}$

$k=8$

$n=10$

$t_{k+1} = {}_nC_k x^{n-k} y^k$

$t_9 = {}_{10}C_8 (x)^{10-8}(-2)^8$

$= 45x^2(256)$

$t_9 = 11\,520x^2$

Ex. 2) Given $(2x - y^3)^6$

a) determine the 4th term.

$n=6$
$k=3$

$t_4 = {}_6C_3(2x)^3(-y^3)^3$

$= 20(8x^3)(-y^9)$

$= -160x^3y^9$

b) determine the last term. # of terms

$\to n+1$

$6+1 = 7$ terms

last term t_7

$n=6$
$k=6$

$t_7 = {}_6C_6(2x)^0(-y^3)^6$

$= 1(1)(y^{18})$

$= y^{18}$

c) the middle term $\to t_4$

$t_1 \quad t_2 \quad t_3 \quad t_4 \quad t_5 \quad t_6 \quad t_7$

$n=6$
$k=3$

$t_4 = {}_6C_3(2x)^3(-y^3)^3$

$= -160x^3y^9$

$\leftarrow$ from a)

* **Ex. 2)** In the expansion of $(2x - y^3)^{12}$, determine which term contains y^{15}.

$n = 12$
$k = ?$

$t_{k+1} = {}_nC_k\, x^{n-k}\, y^k$

$y^{15} = \cancel{{}_{12}C_k\,(2x)^{12-k}}\,(-y^3)^k$

need these to be equal

$\therefore y^{15} = y^{3k}$

$15 = 3k$

$k = 5$

t_{k+1}
$\underbrace{t_{5+1}}_{6}$

$\therefore$ the 6^{th} term contains y^{15}

Ex. 3) In the expansion of $\left(a^2 - \frac{1}{a}\right)^5$ which term, in simplified form, contains a? Determine the value of this term.

$n = 5$
$k = ?$

$t_{k+1} = {}_nC_k\, x^{n-k}\, y^k$

ignore coefficients

$a^1 = \cancel{{}_5C_k}\,(a^2)^{5-k}\,\left(\cancel{-}\frac{1}{a}\right)^k$

$a^1 = (a^2)^{(5-k)}\,(a^{-1})^k$

mult exps

$a^1 = a^{10-2k} \cdot a^{-k}$

add exps

$a^1 = a^{10-3k}$

$\therefore 1 = 10 - 3k$

$3k = 9$

$k = 3$

$\therefore 4^{th}$ term

Part 2

$n = 5$
$k = 3$

$t_{k+1} = {}_nC_k\, x^{n-k}\, y^k$

$t_4 = {}_5C_3\,(a^2)^2\left(-\frac{1}{a}\right)^3$

$t_4 = 10a^4\left(-\frac{1}{a^3}\right)$

$t_4 = -10a$

$\frac{-10a^4}{a^3}$

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Review pg. 341

Assignment: P~~g 743; #5, 9a, 11d, MC #1-3~~