The Binomial Theorem II (11.3) p542 day 6

The Binomial Theorem

$$(a+b)^n = \sum_{r=0}^{n} {}_nC_r a^{n-r} b^r$$

sigma

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

${}_3C_0$ ${}_3C_1$ ${}_3C_2$ ${}_3C_3$

try: 6b

6b 1 5 10 10 5 1

$(3a-2b)^5$ $n=5$

$= {}_5C_0(3a)^5(-2b)^0 + {}_5C_1(3a)^4(-2b)^1$

$+ {}_5C_2(3a)^3(-2b)^2 + {}_5C_3(3a)^2(-2b)^3$

$+ {}_5C_4(3a)^1(-2b)^4 + {}_5C_5(3a)^0(-2b)^5$

$= 243a^5 + 5\cdot 81a^4(-2b) + 10\cdot 27a^3(4b^2) + 10\cdot 9a^2(-8b^3)$

$+ 5(3a)(16b^4) + (-32b^5)$

$= 243a^5 - 810a^4b + 1080a^3b^2 - 720a^2b^3$

$+ 240ab^4 - 32b^5$

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0 1 2 3 4 5 6 7

ex1: Find the 7th term of $(x-2)^{12}$ ${}_nC_r a^{n-r} b^r$

$n = 12$

$r = 6$

$a = x$

$b = (-2)$

$\therefore {}_{12}C_6(x)^{12-6}(-2)^6$

$= 924x^6(64)$

$= 59136x^6$

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ex2: Find the 9th term of $(3x-2y)^{13}$

$n = 13$

$r = 8$

$a = 3x$

$b = -2y$

$\therefore {}_{13}C_8(3x)^{13-8}(-2y)^8$

$= 1287(243x^5)(256y^8)$

$= 80,061,696x^5y^8$

$3^5 = 243$

$(3x)^5$

3^5x^5

$243x^5$

ex3: Find the 13th term of $(4a+b)^{17}$

$n = 17$

$r = 12$

$a = 4a$

$b = b$

${}_{17}C_{12}(4a)^5(b)^{12}$

$= 6188(1024a^5)b^{12}$

$= 6337536a^5b^{12}$

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