

AFM Unit 6

Hw 5 - Binomial Expansion

① coefficient of x^4 in $(x+2)^6$

x^4 will be the third term!

$$C(6, 2) x^4 \cdot 2^2$$

$$15 \cdot x^4 \cdot 4$$

coeff: $\boxed{60}$

③ coefficient of x in $(x+3)^3$

x will be the third term!

$$C(3, 2) x \cdot 3^2$$

$$3 \cdot x \cdot 9$$

coeff: $\boxed{27}$

⑤ coefficient of b^4 in $(a+b)^7$

b^4 will be the fifth term

$$C(7, 4) a^3 b^4$$

$$35 \cdot 8 \cdot b^4$$

coeff: $\boxed{280}$

⑦ 2nd term in $(ax+ay)^3$

$$C(3, 1) (ax)^2 y$$

$$3 \cdot 4x^2 \cdot y$$

$\boxed{12x^2y}$

⑨ 3rd term in $(x+y)^6$

$$C(6, 2) (x)^4 y^2$$

$\boxed{15x^4y^2}$

⑪ 1st term in $(4y-1)^4$

$$C(4, 0) (4y)^4 (-1)^0$$

$$1 \cdot 256y^4 \cdot 1$$

$\boxed{256y^4}$

② coefficient of x in $(x+3)^4$

x will be the fourth term!

$$C(4, 3) x^1 (3)^3$$

$$4 \cdot x \cdot 27$$

coeff: $\boxed{108}$

④ coefficient of y^2 in $(5+y)^3$

y^2 will be the third term

$$C(3, 2) 5^1 y^2$$

$$3 \cdot 5 \cdot y^2$$

coeff: $\boxed{15}$

⑥ coefficient of y^2 in $(y+3)^4$

y^2 will be the third term

$$C(4, 2) y^2 3^2$$

$$6 \cdot y^2 \cdot 9$$

coeff: $\boxed{54}$

⑧ 3rd term in $(3x+1)^4$

$$C(4, 2) (3x)^2 (1)^2$$

$$6 \cdot 9x^2 \cdot 1$$

$\boxed{54x^2}$

⑩ 3rd term in $(2a-b)^4$

$$C(4, 2) (2a)^2 (-b)^2$$

$$6 \cdot 4a^2 \cdot b^2$$

$\boxed{24a^2b^2}$

⑫ 3rd term in $(b-2a)^5$

$$C(5, 2) (b)^3 (-2a)^2$$

$$10 \cdot b^3 \cdot 4a^2$$

$\boxed{40a^2b^3}$

$$(13) (y+3x)^4$$

$$C(4,0)y^4(3x)^0 + C(4,1)y^3(3x)^1 + C(4,2)y^2(3x)^2 + C(4,3)y^1(3x)^3 + C(4,4)y^0(3x)^4$$
$$1 \cdot y^4 + 4 \cdot y^3 \cdot 3x + 6 \cdot y^2 \cdot 9x^2 + 4 \cdot y \cdot 27x^3 + 1 \cdot 81x^4$$
$$y^4 + 12y^3x + 54y^2x^2 + 108yx^3 + 81x^4$$

$$(14) (a+b)^6$$

$$C(6,0)a^6b^0 + C(6,1)a^5b^1 + C(6,2)a^4b^2 + C(6,3)a^3b^3 + C(6,4)a^2b^4 + C(6,5)a^1b^5 + C(6,6)a^0b^6$$
$$a^6 + 6a^5b + 15a^4b^2 + 20a^3b^3 + 15a^2b^4 + 6ab^5 + b^6$$

$$(15) (x+y)^4$$

$$C(4,0)x^4y^0 + C(4,1)x^3y^1 + C(4,2)x^2y^2 + C(4,3)x^1y^3 + C(4,4)x^0y^4$$
$$x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$$

$$(16) (x-ay)^5$$

$$C(5,0)x^5(-ay)^0 + C(5,1)x^4(-ay)^1 + C(5,2)x^3(-ay)^2 + C(5,3)x^2(-ay)^3 + C(5,4)x^1(-ay)^4 + C(5,5)x^0(-ay)^5$$
$$x^5 + 5 \cdot x^4 \cdot (-ay) + 10 \cdot x^3 \cdot 4y^2 + 10 \cdot x^2 \cdot (-8y^3) + 5 \cdot x \cdot 16y^4 + 1 \cdot (-32y^5)$$
$$x^5 - 10x^4y + 40x^3y^2 - 80x^2y^3 + 80xy^4 - 32y^5$$

$$(17) (y+3)^4$$

$$C(4,0)y^43^0 + C(4,1)y^33^1 + C(4,2)y^23^2 + C(4,3)y^13^3 + C(4,4)y^03^4$$
$$y^4 + 4 \cdot y^3 \cdot 3 + 6 \cdot y^2 \cdot 9 + 4 \cdot y \cdot 27 + 1 \cdot 81$$
$$y^4 + 12y^3 + 54y^2 + 108y + 81$$

$$(18) (5m-n)^3$$

$$C(3,0)(5m)^3(-n)^0 + C(3,1)(5m)^2(-n)^1 + C(3,2)(5m)^1(-n)^2 + C(3,3)(5m)^0(-n)^3$$
$$1 \cdot 125m^3 + 3 \cdot 25m^2 \cdot (-n) + 3 \cdot 5m \cdot n^2 + 1 \cdot (-n^3)$$
$$125m^3 - 75m^2n + 15mn^2 - n^3$$

$$(19) (y+4x)^4$$

$$C(4,0)y^4(4x)^0 + C(4,1)y^3(4x)^1 + C(4,2)y^2(4x)^2 + C(4,3)y^1(4x)^3 + C(4,4)y^0(4x)^4$$
$$y^4 + 4 \cdot y^3 \cdot 4x + 6 \cdot y^2 \cdot 16x^2 + 4 \cdot y \cdot 64x^3 + 1 \cdot 256x^4$$
$$y^4 + 16y^3x + 96y^2x^2 + 256yx^3 + 256x^4$$

$$(20) (b-3)^5$$

$$C(5,0)b^5(-3)^0 + C(5,1)b^4(-3)^1 + C(5,2)b^3(-3)^2 + C(5,3)b^2(-3)^3 + C(5,4)b^1(-3)^4 + C(5,5)b^0(-3)^5$$
$$b^5 + 5 \cdot b^4 \cdot -3 + 10 \cdot b^3 \cdot 9 + 10 \cdot b^2 \cdot -27 + 5 \cdot b \cdot 81 + 1 \cdot -243$$
$$b^5 - 15b^4 + 90b^3 - 270b^2 + 405b - 243$$

$$(21) (1-3b)^3$$

$$C(3,0)1^3(-3b)^0 + C(3,1)1^2(-3b)^1 + C(3,2)1^1(-3b)^2 + C(3,3)1^0(-3b)^3$$
$$1 + 3 \cdot 1 \cdot -3b + 3 \cdot 1 \cdot 9b^2 + 1 \cdot -27b^3$$
$$1 - 9b + 27b^2 - 27b^3$$

$$(22) (2b-1)^6$$

$$C(6,0)(2b)^6(-1)^0 + C(6,1)(2b)^5(-1)^1 + C(6,2)(2b)^4(-1)^2 + C(6,3)(2b)^3(-1)^3 + C(6,4)(2b)^2(-1)^4$$
$$+ C(6,5)(2b)^1(-1)^5 + C(6,6)(2b)^0(-1)^6$$
$$64b^6 + 6 \cdot 32b^5 \cdot -1 + 15 \cdot 16b^4 \cdot 1 + 20 \cdot 8b^3 \cdot -1 + 15 \cdot 4b^2 \cdot 1 + 6 \cdot 2b \cdot -1 + 1$$
$$64b^6 - 192b^5 + 240b^4 - 160b^3 + 60b^2 - 12b + 1$$