

Degree of a polynomial

- $p(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$ is a polynomial.

$$\text{degree}(p(x)) = n$$

$a_i x^i$: the i th term.
 a_i : coefficient

$$p(x_1, \dots, x_n) = \sum_{i_1, i_2, \dots, i_n} a_{i_1, i_2, \dots, i_n} x_1^{n_{i1}} x_2^{n_{i2}} \dots x_n^{n_{in}}$$

$$\text{degree}(p(x_1, \dots, x_n)) = \max(n_{i1} + n_{i2} + \dots + n_{in})$$

Ex : ① $p(x) = 2^7 - 5x^2 + 2 + 5 = a_0 = a_0 x^0 \rightarrow d^0(p(x)) = 0$.

② $p(x) = x^7 \rightarrow d^0(p(x)) = 7$.

③ $p(x, y) = -7y^4 x^7 \rightarrow d^0(p(x, y)) = 4+7 = 11$.

④ $p(x, y) = x^7 - 7y^4 x^7 - 5y^7 \rightarrow d^0(p(x, y)) = \max\{7, 11, 7\} = 11$.

Ex :

① $p(x, y, z) = -5x^7 z^4 y^7 + y^4$

$$d^0(-5x^7 z^4 y^7) = 7+4+7 = 18$$

$$d^0(y^4) = 4$$

$$d^0(p(x, y, z)) = 18$$

② $p(x, y, z) = (7x + 4y^2 + z^5)(-5x^7 z^4 y^4 + y^4)$

$d^0 = 1$ $d^0 = 2$ $d^0 = 5$ $d^0 = 18$ $d^0 = 4$

$$d^0(z^5 \cdot (-5x^7 z^4 y^4)) = 18+5 = 23$$

$$d^0(4y^2 \cdot (-5x^7 z^4 y^4)) = 2+18 = 20$$

$$d^0(p(x, y, z)) = 23$$