

8/24 LAST TIME: SETS, SUBSETS, POWER SETS

TODAY: IMPORTANT SETS IN TOPOLOGY [ALL SUBSETS OF  $\mathbb{R}^n$ ]

$\mathbb{R}$  = set of all real #s  $\rightarrow$  (n-dimensional Euclidean space)

$\triangleright$  Fix an integer  $n \geq 0$ .  $\mathbb{R}^n$  is defined to be the set of all ordered n-tuples of real #s

• ex: (n=2)  $\mathbb{R}^2 = \{ (x_1, x_2) \mid x_1, x_2 \in \mathbb{R} \}$

(n=3)  $\mathbb{R}^3 = \{ (x_1, x_2, x_3) \mid x_i \in \mathbb{R} \}$

(n=0)  $\mathbb{R}^0 = *$  A point (one-element set)

(n=1)  $\mathbb{R} =$  real line

(n=4)  $\mathbb{R}^4 = \{ (x_1, x_2, x_3, x_4) \mid x_i \in \mathbb{R} \}$

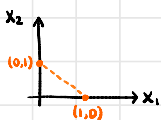
$$\Delta^n = \{ (x_1, x_2, \dots, x_{n+1}) \mid \sum_{i=1}^{n+1} x_i = 1 \text{ \& FOR ALL } i, 0 \leq x_i \}$$

$\Delta^0$



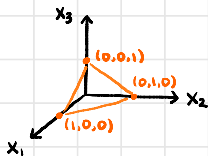
$$\sum_{i=1}^{0+1} x_i = 1$$

$\Delta^1$



$$\sum_{i=1}^{1+1} x_i + x_2 = 1, \quad x_1, x_2 \geq 0$$

$\Delta^2$



$$\sum_{i=1}^{2+1} x_i + x_2 + x_3 = 1$$