Date: 29.05.2018

①

Notation

Diff b/w notation $\min_x f(x)$ / $\max_x f(x)$ and $\arg\min_x f(x)$ / $\arg\max_x f(x)$

A: $\min_x f(x)$ → denotes minimum Value of $f(x)$, wrt to the Variable x
or
minimize function $f(x)$ over the variable x

$\arg\min_x f(x)$ → denote Value of "x" for which $f(x)$ attains minimum Value.

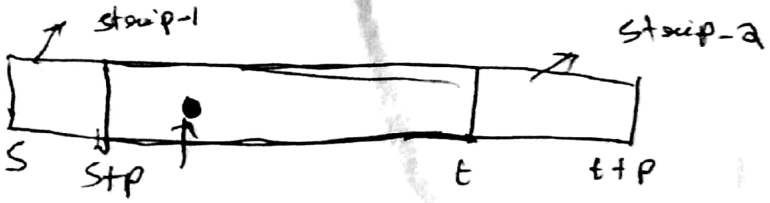
$\max_x f(x)$ → Denote maximum value of $f(x)$ wrt to the variable x
or
maximize function $f(x)$ over the variable x

$\arg\max_x f(x)$ → Denote Value of "x" for which $f(x)$ attains maximum Value.

Summation Proofs:

Q: Prove $\sum_{n=s}^{t} f(n) = \sum_{n=s+p}^{t+p} f(n-p)$

A: $\sum_{n=s}^{t} f(n) = \sum_{n=s+p}^{t+p} f(n-p)$



Each Point in (s+p to t+p) Strip-2, we are draging it p units back to equal sum to strip-1

Hence, $\sum_{n=s}^{t} f(n) = \sum_{n=s+p}^{t+p} f(n-p)$

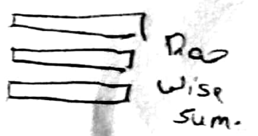
Q: Prove $\sum_{i=0}^{m}\sum_{j=0}^{n} a_{i,j} = \sum_{j=0}^{n}\sum_{i=0}^{m} a_{i,j}$

A: Let $a_{i,j} \in A$ (Matrix)

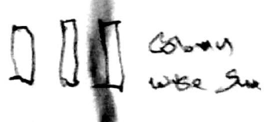
$A \in \mathbb{R}^{m \times n}$

$$\begin{array}{cc} & \downarrow j \text{ (column)} \\ \xrightarrow[i]{} \text{ (Row)} & A = \begin{bmatrix} a_{0,0} & a_{0,1} & \cdots & a_{0,n} \\ \vdots & & & \\ a_{m,0} & a_{m,1} & \cdots & a_{m,n} \end{bmatrix} \end{array}$$

$\sum_{i=0}^{m}\sum_{j=0}^{n} a_{i,j}$ denote sum of sum of rows



$\sum_{j=0}^{n}\sum_{i=0}^{m} a_{i,j}$ denote sum of sum of columns



Both are Same (total sum of matrix elements)