(2) prove both are same.

$$\underbrace{\sum_{i=1}^{3}\sum_{j=1}^{3} x_i y_{ij}}_{(a)} = \underbrace{\sum_{i=1}^{3}\left(x_i \sum_{j=1}^{3} y_{ij}\right)}_{(b)}$$

(a) $$\sum_{i=1}^{3}\sum_{j=1}^{3} x_i y_{ij} = \sum_{i=1}^{3}\left(\sum_{j=1}^{3} x_i y_{ij}\right) = \sum_{i=1}^{3}\left((x_i y_{i1}) + (x_i y_{i2}) + (x_i y_{i3})\right)$$

$$= \left((x_1 y_{11}) + (x_1 y_{12}) + (x_1 y_{13})\right) +$$
$$\left((x_2 y_{21}) + (x_2 y_{22}) + (x_2 y_{23})\right) +$$
$$\left((x_3 y_{31}) + (x_3 y_{32}) + (x_3 y_{33})\right)$$

(b) $$\sum_{i=1}^{3}\left(x_i \sum_{j=1}^{3} y_{ij}\right) = \sum_{i=1}^{3}\left(x_i\left(\sum_{j=1}^{3} y_{ij}\right)\right) = \sum_{i=1}^{3} x_i\left((y_{i1} + y_{i2} + y_{i3})\right)$$

$$= \left(x_1(y_{11} + y_{12} + y_{13})\right) + \left(x_2(y_{21} + y_{22} + y_{23})\right) +$$
$$\left(x_3(y_{31} + y_{32} + y_{33})\right)$$

$$= \left(x_1 y_{11} + x_1 y_{12} + x_1 y_{13}\right) +$$
$$\left(x_2 y_{21} + x_2 y_{22} + x_2 y_{23}\right) +$$
$$\left(x_3 y_{31} + x_3 y_{32} + x_3 y_{33}\right)$$

- If it is a set, not the sequence.

$X = \{x_1, x_2, x_3\}$

$$\sum_{x \in X} x = x_1 + x_2 + x_3$$

$$\prod_{x \in X} x = x_1 \cdot x_2 \cdot x_3$$

$$\prod_{x \in X, x \neq 0} x$$