Verify that all the "desirable" properties of canonical information are satisfied:

1. Existence and Uniqueness: NO, (n, S, R) - Represents vectors without respect ~~of~~ order of vectors

2. Completeness: YES:

$X = \frac{1}{n}\sum_{i=1}^{n} x_i$, where can. info (n, S, R), so

$$\boxed{X = \frac{1}{n} S}$$

$$V = \frac{1}{n-1}\sum (x_i - X)(x_i - X)^T = \boxed{\frac{1}{n-1}(R - S - S^T + nXX^T)}$$

3. Elementary: YES

Canonical information for single observation will be like

$(n, S, R) = (1, X_i, X_i X_i^T)$

4. Empty: YES

Canonical Information for empty dataset is

$(n, S, R) = (0, [\dots], [\vdots\,\vdots])$

Nil vector, Nill matrix

5. Combination

a. $(n_1, S_1; R_1)$, $(n_2; S_2; R_2)$ $\oplus$ - $(n_1 + n_2, S_1 + S_2, R_1 + R_2)$

$[\vdots] + [\vdots]$ $[\vdots\,\vdots] + [\vdots\,\vdots]$

b. $(n_1; S_1; R_1)$, $(0, [\dots], [\vdots\,\vdots])$ $\oplus$ - (n_1, S_1, R_1)