Problem 1.

Let $\boldsymbol{x} = (x_1, \cdots, x_m)^\top \in \mathbb{R}^m$ be the outcome of m repeated trials, and we denote the mean by μ. An empirical estimate of the second-order raw moment is

$$\frac{1}{m}\sum_{i=1}^{m}(x_i^2)$$

and a (biased) empirical estimate of the second-order central moment is

$$\frac{1}{m}\sum_{i=1}^{m}[(x_i - \mu)^2]$$

Express them in vector representations. In other words, you may use $\boldsymbol{x}$, μ, and vector/scalar operators. Summations are not allowed.

Here, nth order raw moment is $\mathbb{E}[X^n]$ and nth order central moment is $\mathbb{E}[(X-\mu)^n]$. The definitions per se are not needed for solving the problem.

Hint: The question is to write math equations, not code.

END OF W1