FA2 APM1111 – Statistical Theory

Answers Exercises 3.49, 3.51, and 3.90.

3.49

Prove that $\sum_{j=1}^{N}(X_j - 1)^2 = \sum_{j=1}^{N} X_j^2 - 2\sum_{j=1}^{N} X_j + N$.

Proof:

$$\sum_{j=1}^{N}(X_j - 1)^2 = \sum_{j=1}^{N} X_j^2 - 2\sum_{j=1}^{N} X_j + 1$$

$$= \sum_{j=1}^{N}\left(X_j^2 - 2X_j + 1\right)$$

$$= \sum_{j=1}^{N} X_j^2 - \sum_{j=1}^{N} 2X_j + \sum_{j=1}^{N} 1$$

$$= \sum_{j=1}^{N} X_j^2 - 2\sum_{j=1}^{N} X_j + N$$

3.51

Two variables, U and V, assume the values $U_1 = 3$, $U_2 = -2$, $U_3 = 5$, and $V_1 = -4$, $V_2 = -1$, $V_3 = 6$, respectively. Calculate (*a*) $\sum UV$, (*b*) $\sum(U+3)(V-4)$, (*c*) $\sum V^2$, (*d*) $(\sum U)(\sum V)^2$, (*e*) $\sum UV^2$, (*f*) $\sum(U^2 - 2V^2 + 2)$, and (*g*) $\sum(U/V)$.

3.90 Find the geometric mean of the sets (a)3,5,8,3,7,2and(b) 28.5, 73.6, 47.2, 31.5, 64.8.

Link of GitHub of answers for 3.51 and 3.90:

https://github.com/zzprogram/APM1111/blob/main/FA2_CURIMATMAT.ipynb