Here is a score matrix where the rows represent observations and the columns represent variables:

$$\mathbf{X} = \begin{bmatrix} 12 & 3 & -6 \\ 16 & 2 & 2 \\ 20 & 5 & -3 \\ 10 & -2 & -8 \end{bmatrix}$$

Compute $\mathbf{X}^t\mathbf{X}$, the sums of squares and cross products matrix uncorrected for the mean.

Compute the mean vector for this matrix. Call the mean vector $\bar{\mathbf{x}}$.

Calculate the sum of squares and cross products matrix corrected for the mean:

Calculate $\mathbf{X}^t\mathbf{X} - n\bar{\mathbf{x}}\bar{\mathbf{x}}^t$, where n is the number of rows or 4 in this case. Compare your calculations with the ones given above for the sum of squares and cross products matrix corrected for the mean.

Calculate the covariance matrix.

Calculate the vector of standard deviations.

Calculate the correlation matrix.

Add 6 to every element in **X**. Compute the SSCP matrix corrected for the mean, the covariance matrix and the correlation matrix. What do the results verify about a covariance matrix and a correlation matrix?

Multiply every element in **X** by 3. Compute the SSCP matrix corrected for the mean, the covariance matrix and the correlation matrix. What do the results illustrate about a covariance matrix and a correlation matrix?