Exercise 2.4

In an investigation on the relationship between weather and crops the following variables were measured:

- X_1 : Yield of hay in cwt per acre
- X_2: Spring rainfall in inches
- X_3: Accumulated temperature above 42° F in the spring

Based on observations from 20 years (ie. n=20), the following estimates were obtained:

- $\hat{\mu}_1$ = 28.02, $\hat{\sigma}_1$ = 4.42, $\hat{\rho}_{12}$ = 0.80
- $\hat{\mu}_2$ = 4.91, $\hat{\sigma}_2$ = 1.10, $\hat{\rho}_{13}$ = −0.40
- $\hat{\mu}_3$ = 594, $\hat{\sigma}_3$ = 85, $\hat{\rho}_{23}$ = −0.56

1. Give a direct interpretation of the correlations between the yield and the two weather variables.
2. Compute (by hand) the partial correlation between yield and temperature given the rainfall.
3. Compute the partial correlation between yield and temperature given the rainfall.
4. Comment on this result.
5. Organize the estimated means and variances in a vector and a matrix, respectively, in R. Use the `eigen()` function to work out automated solutions for the above, given the mean vector and variance matrix.

Source: The data are due to R.H. Hooker (1907), and quoted from M.G. Kendall and Alan Stuart: The Advanced theory of Statistics, Volume 2. Charles Griffin, 1960.