Practical questions related to linear combinations of variables using R

1. Let $\mathbf{Y}=\begin{bmatrix}Y_1\\Y_2\\Y_3\end{bmatrix}$ is a random vector with mean vector $\begin{bmatrix}26\\18\\51\end{bmatrix}$ and covariance matrix $\begin{bmatrix}70 & 35 & 50\\35 & 92 & 30\\50 & 30 & 85\end{bmatrix}$.

   (a) Find the mean and variance of the linear combination $z = 2Y_1 + 4Y_2 - Y_3$.

   (b) Find the mean vector and covariance matrix of the following linear combinations

$$Z_1 = Y_1 + Y_2 - 3Y_3$$

$$Z_2 = 6\,Y_1 - 2Y_2 + Y_3$$

$$Z_1 = Y_1 - 4Y_2 - 5Y_3$$

2. Find the mean vector and covariance matrix of the following linear combinations based on the data file ***data1.xls***. The data file ***data1.xls*** consists of five variables Y_1, Y_2, Y_3, Y_4 and Y_5.

$$C_1 = 3Y_1 + Y_2 - 3Y_3 + 4\,Y_4 + 7\,Y_5$$
$$C_2 = -Y_1 + Y_2 - Y_3 + 2Y_4 + 9\,Y_5$$
$$C_3 = 3Y_1 + Y_2 + 3\,Y_5$$
$$C_4 = 6Y_1 + 3Y_2 + Y_3 + 11Y_4 + 10Y_5$$