# Summary

- Suppose in a trivariate or multi-variate distribution we are interested in the relationship between two variables. Only. There are two alternatives viz.,
    - We consider only those two members of the observed data in which the other members have specified values or
    - We may eliminate mathematically the effect of other variates on two variates.
- The first method has the disadvantage that it limits the size of the data and also it will be applicable to only the data in which the other variates have assigned values. In the second method it may not be possible to eliminate the entire influence of the variates but the linear effect can be easily eliminated. The correlation and regression between only two variates eliminating the linear effect of other variates in them is called the partial correlation and partial regression.
- The equation of the plane of regression of $X_1$ on $X_2$ and $X_3$ is
  $X1 = b_{12.3} X_2 + b_{13.2} X_3$
  The constants b in the above equation are determined by the principle of least square
- Sometimes the correlation between two variables $X_1$ and $X_2$ may be partly due to the correlation of a third variable, $X_3$ with both $X_1$ and $X_2$. In such a situation, one may want to know what the correlation between $X_1$ and $X_2$ would be if the effect of $X_3$ on each of $X_1$ and $X_2$ were eliminated. This correlation is called the partial correlation and the correlation coefficient between $X_1$ and $X_2$ the linear effect of $X_3$ on each of them has been eliminated is called the partial correlation coefficient.
- Partial correlation coefficient helps in deciding whether to include or not an additional independent variable in regression analysis.