STA 3180 Statistical Modelling: Multivariate Analysis

1. Given a set of data points (x1, y1), (x2, y2), (x3, y3), (x4, y4), (x5, y5), calculate the multiple correlation coefficient (R) and the coefficient of determination (R2).

Solution: R = (x1y1 + x2y2 + x3y3 + x4y4 + x5y5 - (x1 + x2 + x3 + x4 + x5)(y1 + y2 + y3 + y4 + y5)/5) / sqrt[(x1^2 + x2^2 + x3^2 + x4^2 + x5^2 - (x1 + x2 + x3 + x4 + x5)^2/5)(y1^2 + y2^2 + y3^2 + y4^2 + y5^2 - (y1 + y2 + y3 + y4 + y5)^2/5)]

R2 = R^2

2. Calculate the partial correlation coefficient between two variables X and Y, given that there is a third variable Z in the model.

Solution: Partial correlation coefficient between X and Y given Z = (Cov(X,Y) - Cov(X,Z)Cov(Y,Z)) / sqrt[Var(X) - Cov(X,Z)^2]sqrt[Var(Y) - Cov(Y,Z)^2]

3. Calculate the coefficient of multiple determination (R2) for a multiple linear regression model with three independent variables.

Solution: R2 = 1 - (SSE/SST), where SSE is the sum of squared errors and SST is the total sum of squares.

4. Calculate the coefficient of partial determination (R2) for a multiple linear regression model with three independent variables.

Solution: R2 = 1 - (SSE/SST), where SSE is the sum of squared errors and SST is the total sum of squares, adjusted for the effect of the other independent variables.

5. Calculate the coefficient of determination (R2) for a multiple logistic regression model with three independent variables.

Solution: R2 = 1 - (SSE/SST), where SSE is the sum of squared errors and SST is the total sum of squares.