1 Pitman & Morgan Test

This test assess the equality of population variances of Y_1 and Y_2 where there are bivariate normally distributed. $E(Y_1) = \mu_1$ and $E(Y_2) = \mu_2$, $\text{var}(Y_1) = \sigma_1^2$ and $\text{var}(Y_1) = \sigma_2^2$. ($-1 \leq \rho \leq 1$).

$$\sigma_1^2 = \sigma_2^2$$

Pitman's test tests for zero correlation between the sums and products.

Correlation between differences and means is a test statistics for the null hypothesis of equal variances given bivariate normality.

1.1 The Pitman-Morgan Test

The test of the hypothesis that the variances σ_1^2 and σ_2^2 are equal, which was devised concurrently by *Pitman* and *Morgan*, is based on the correlation of D with S, the coefficient being $\rho_{DS} = (\sigma_1^2 - \sigma_2^2)/(\sigma_D \sigma_S)$, which is zero if, and only if, $\sigma_1^2 = \sigma_2^2$. Consequently a test of H$''$: $\sigma_1^2 = \sigma_2^2$ is equivalent to a test of H$''$: $\rho_{DS} = 0$ and the test statistic is the familiar t-test for a correlation coefficient with $(n-2)$ degrees of freedom.