

7D Difference Between Means of Two Independent Normal Distributions

Pooled estimate of the common variance σ^2 : $s_p^2 =$

1. A random sample of 15 observations is taken from a population and gives an unbiased estimate for the population variance of 9.47. A second random sample of 12 observations is taken from a different population that has the same population variance as the first population, and gives an unbiased estimate for the variance as 13.84. Calculate an unbiased estimate of the population variance σ^2 using both samples.

The three assumptions needed when the sample sizes are small:

Distribution of the test statistic for the difference between two means:

Confidence interval for $\mu_x - \mu_y$ when the variances are equal but unknown:

2. In a survey on the petrol consumption of cars, a random sample of 12 cars with 2-litre engines was compared with a random sample of 15 cars with 1.6-litre engines. The following results show the consumption, in suitable units, of the cars:

2-litre cars: 34.4, 32.1, 30.1, 32.8, 31.5, 35.8, 28.2, 26.6, 28.8, 28.5, 33.6, 28.8

1.6-litre cars: 35.3, 34.0, 36.7, 40.9, 34.4, 39.8, 33.6, 36.7, 34.0, 39.2, 39.8, 38.7, 40.8, 35.0, 36.7

Calculate a 95% confidence interval for the difference between the two mean petrol consumption figures. You may assume that the variables are normally distributed and that they have the same variance.