Statistics IV

Analyses with multiple data sets and ANOVA

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Answers to additional problems

35.1 We can use an F-test to compare whether the variances of the two sets of data are equal or unequal. From eqn. (35.1), $F = 0.823^2/0.432^2 = 0.6773/0.1867 = 3.629$. We have taken care to ensure that $F > 1$, by writing the variance for Method 2 in the numerator. If we set the significance level $\alpha = 0.05$ then the number of degrees of freedom of the numerator is $8 - 1 = 7$, and the degrees of freedom of the denominator $= 10 - 1 = 9$. Using Table 35.3, we find that $F_{critical} = F(0.05, 7, 9) = 3.293$. Since $F > F_{critical}$, we find it is statistically significant that the variances are unequal. We must therefore use the two-sample t-test for unequal variances to compare the means.

35.2 The data tell us that the mean mass of variant (**I**) adsorbed $\bar{x}$ is smallest for silica 4. Being smaller, it represents the smallest amount of pharmaceutical lost to adsorption and therefore more is available to be sold.

35.3 We calculate an F-statistic of 3.540. From the data in Table 35.3 and assuming a significance level of 0.05, the value of $F_{critical}$ when both data sets have $DF = 6$ is 4.284. The F-statistic is less than $F_{critical}$ so we accept the null hypothesis.

35.4 We calculate an F-statistic of 5.753. From the data in Table 35.3 and assuming a significance level of 0.05, the value of $F_{critical}$ =3.482 when DF for the numerator is 5 and DF for the denominator is 9. The statistic is greater than $F_{critical}$. Being greater, we reject the null hypothesis and look for an alternative hypothesis.