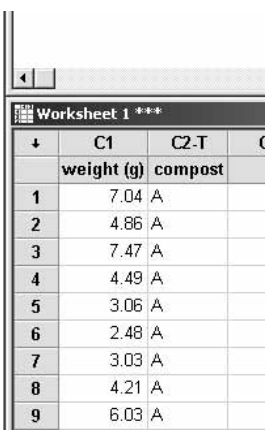
7.5. Parametric one-way ANOVA with equal numbers of replicates

EXAMPLE 7.4. The effectiveness of weaning plantlets of *Lobelia* 'Hannah' from tissue culture onto one of four composts

BOX 7.5. How to carry out an F_{max} test to check for homogeneous variances, before carrying out an anova

Minitab doesn't actually do an *F* test: instead, it does Bartlett's test and Levene's test, which both check for homogeneity of variance. These are said to be more flexible than an *F* test – see the Minitab 'Help' files for more details.

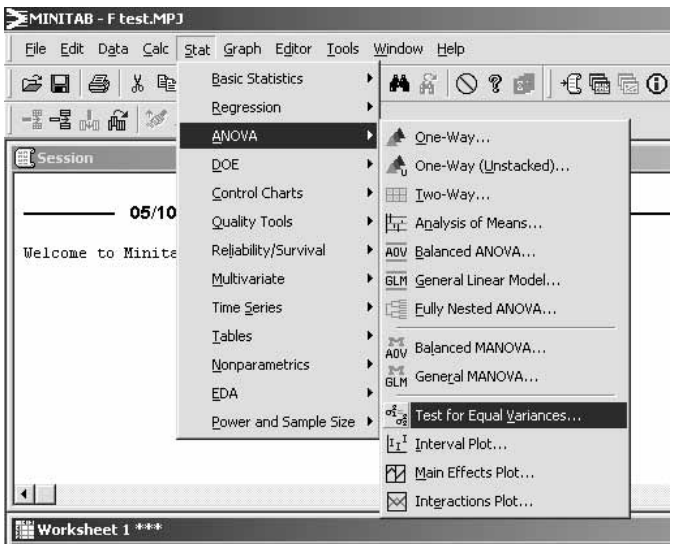
Step 1. Enter your data into the worksheet window of Minitab, using sensible headings for your columns.



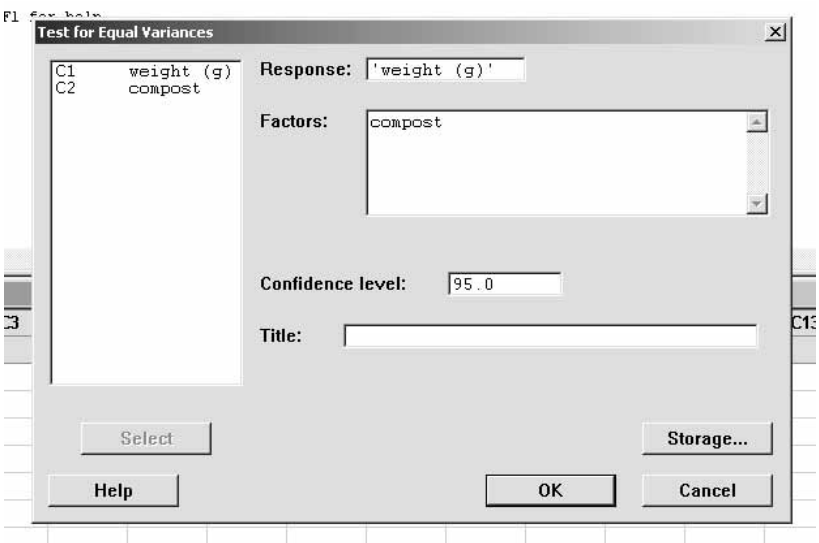
Worksheet 1 ***

↓	C1	C2-T
	weight (g)	compost
1	7.04	A
2	4.86	A
3	7.47	A
4	4.49	A
5	3.06	A
6	2.48	A
7	3.03	A
8	4.21	A
9	6.03	A

Step 2. Perform the test. Go to 'Stat', 'ANOVA', 'Test for Equal Variances'.



Transfer 'weight (g)' into the 'Response' window by clicking on it to highlight it, then clicking on 'Select' to transfer it. In the same way, transfer 'compost' to the 'Factor' window. The default confidence level of 95% corresponds to $p = 0.05$, so it is OK.



Click on 'OK'. Some of the output will appear in the 'Session' window, and a graph will appear in separate new window.

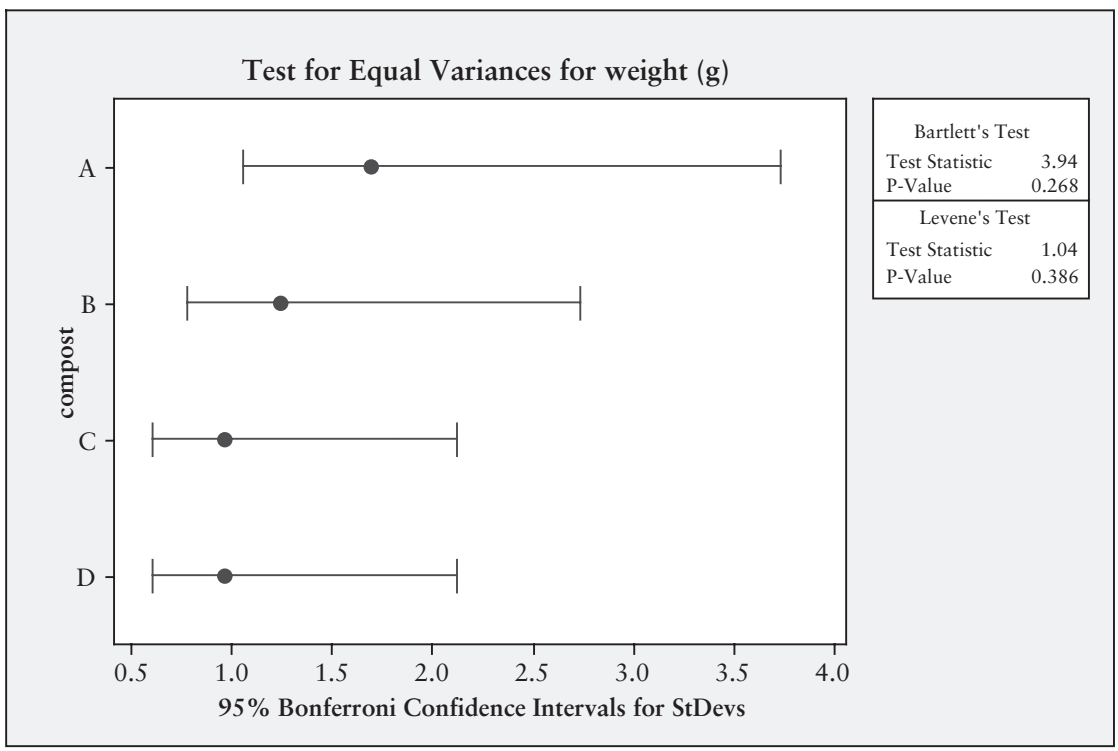
Test for Equal Variances: weight (g) versus compost

95% Bonferroni confidence intervals for standard deviations

compost	N	Lower	StDev	Upper
A	10	1.05596	1.68719	3.73126
B	10	0.77588	1.23969	2.74160
C	10	0.60031	0.95916	2.12120
D	10	0.60131	0.96077	2.12475

Bartlett's Test (normal distribution)
Test statistic = 3.94, p-value = 0.268

Levene's Test (any continuous distribution)
Test statistic = 1.04, p-value = 0.386



Step 3. Decide what the results mean.
The p values for Bartlett's and Levene's tests are 0.268 and 0.386 respectively – both considerably higher than 0.05. The graph shows that the confidence ranges all overlap. Therefore we conclude that there is no significant difference at $p = 0.05$ between the variances of the fresh weight (g) of the plantlets weaned on different composts and may proceed with the ANOVA.