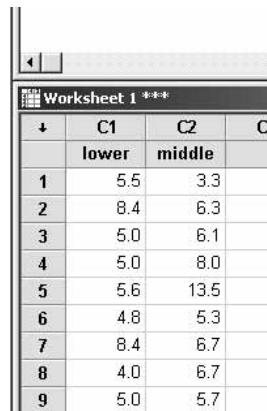

8.1. Mann–Whitney U test

EXAMPLE 7.2. The evolution of *Littorina littoralis* at Porthcawl, 2002

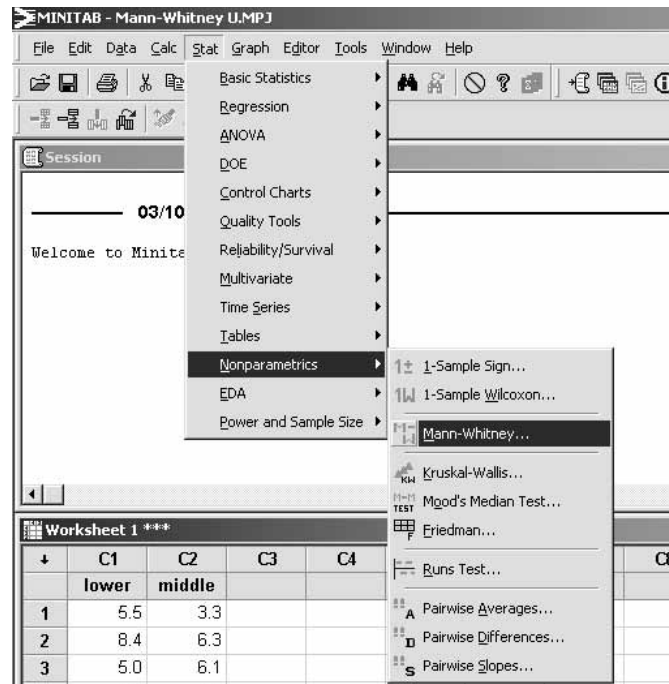
BOX 8.1. How to carry out a Mann–Whitney U test

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



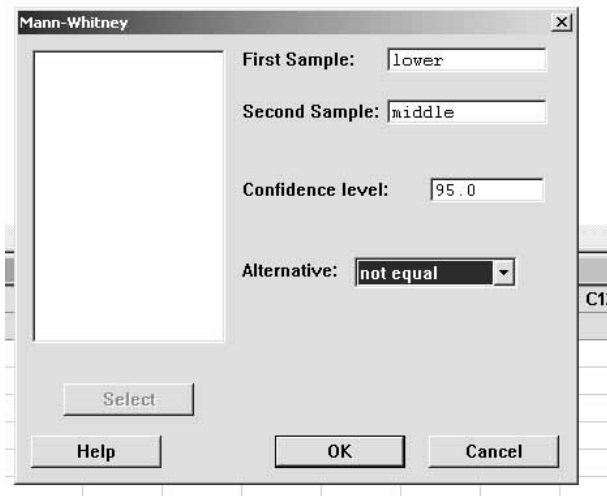
	C1	C2	C3
	lower	middle	
1	5.5	3.3	
2	8.4	6.3	
3	5.0	6.1	
4	5.0	8.0	
5	5.6	13.5	
6	4.8	5.3	
7	8.4	6.7	
8	4.0	6.7	
9	5.0	5.7	

Step 2. Perform the test. Go to ‘Stat’, ‘Non-Parametrics’, ‘Mann–Whitney’.



Transfer the two columns of data to be tested from the left-hand window into the 'First Sample' and 'Second Sample' windows by highlighting them in turn, and clicking on 'Select'.

The default confidence level is 95%, which corresponds to $p = 0.05$: this can be changed if you wish. Since we are doing a two-tailed test, the 'alternative' 'not equal' is what we want, and it doesn't matter which order we enter the two columns. (For a one-tailed test, we would change the alternative, and we would have to be careful about which data column is the 'First Sample'.)



Click on 'OK'. The output appears in the 'Session' window.

Mann-Whitney Test and CI: lower, middle

	N	Median
lower	13	5.500
middle	13	6.300

Point estimate for ETA1-ETA2 is -0.700

95.4 Percent CI for ETA1-ETA2 is (-1.699, 0.900)

W=153.5

Test of ETA1=ETA2 vs ETA1 not=ETA2 is significant at 0.2702

The test is significant at 0.2691 (adjusted for ties)

Step 3. Decide what the result means. The final line of the output gives the p value, which is 0.27. This is not small enough to reject the null hypothesis, and so there is no evidence of a difference in shell height between the two samples of periwinkles from different levels on the beach at Porthcawl.