# MA26620: Practical 11 (Mock)

## The Assessed Practical (Mock)

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**Time allowed: 90 minutes**
**QUESTIONS OVERLEAF - TURN OVER ONLY WHEN INSTRUCTED TO BEGIN**

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## 1 Important – please read

- At the end of today's practical, you will hand in your work (as a Word document or PDF) online via a TurnItIn assignment on Blackboard. Instructions for the handing in process are given at the end of the practical instructions.

- Today's practical is worth 20% of the module mark.

- The practical will take place under test conditions. You must therefore not communicate with other students during this practical, either online or in person. The use of mobile phones is not permitted.

- You may consult your notes, textbooks and practical files. The only electronic resources to be allowed in the practical are R Help, Blackboard, the module webpages, files from your M drive, and any files you bring on a USB memory stick.

- Marks will be awarded for choice of outputs/plots, presentation (plot editing) and quality of comments. You are not required to include commands you have used. You should include and analyse *outputs* from R.

- If you wish to use the package `ggplot2`, enable it in the usual way by ticking the relevant box in the packages tab. If this does not work or ggplot2 is not present in the list, you may need to install the package first using `install.packages("ggplot2")`

- You should save your work regularly onto your M drive. You must save your final Word document on your M drive before leaving.

## 2 The `dogwhelks` data set

Download the data file `dogwhelks.csv` from the module webpages (in the Practical worksheets section) and load it into RStudio in the usual way.

The data were gathered in an investigation into the populations of the dog whelk (a type of shellfish) at Aberystwyth and Both. The scientists were interested in the dimensions (mm), weight (g) and colour of the shell and in various characteristics of the rim of the aperture (opening). These were recorded for 90 shells. The variables are as follows:

| Name | Description |
|---|---|
| Length | Length of the shell opening (mm) |
| Width | Width of the shell opening (mm) |
| Weight | Weight after emptying out sea water and drying off outer shell (g) |
| Teeth | Presence (1) or Absence (0) of teeth on rim |
| Colour | 1 = Grey, 2 = Two-tone, 3 = Whitish, 4 = Mottled |
| Rim | Thick = 1, Thin = 2 |
| Location | Aberystwyth = 1, Borth = 2 |

# 3 Questions

1. Construct a table showing the numbers of shells of different colours and a multiple boxplot to compare the distribution of shell weights for the four shell colours. Comment on what the plot shows you. [10 marks]

2. Calculate summary statistics to compare the distribution of shell weights for Aberystwyth and Borth. Comment on what you learn from these. [5 marks]

3. Plot the shell weights against the area of the aperture, assuming this to be approximately rectangular. Use colour to indicate whether or not the shells have teeth on their rims. Calculate also the correlation coefficient between the weight and the area. State the equation of the least squares regression line. Comment on what the plot shows you. [14 marks]

4. Produce a barchart to show how the distribution of shell colour varies between Borth and Aberystwyth. Comment on what the barchart shows you. [8 marks]

5. Create separate dataframes for Borth and Aberystwyth. For each of these locations, test whether the shells with teeth in the dogwhelks dataset are heavier than those without. [13 marks]

# 4 Submitting your work

When you are ready to hand in your final Word document (**preferably as a PDF document** but also acceptable as .docx or .doc documents), go to Blackboard and click "PRACTICAL SUBMISSION" at the top of the menu on the left. Follow the instructions provided, choosing "Choose from this computer" and then upload your file.

You should then be greeted by a screen that asks you to confirm that this is the file you would like to submit. Click Confirm; you should receive a message saying "Congratulations - your submission is complete!". If you do not, then you have not completed submission.

**You MUST save a copy of your final work on your M: drive; you will be asked to provide this if online submission does not complete successfully.**