

### Worksheet Four

*Man had always assumed that he was more intelligent than dolphins because he had achieved so much - the wheel, New York, wars and so on - whilst all the dolphins had ever done was muck about in the water having a good time. Conversely, the dolphins had always believed that they were smarter than man - for precisely the same reasons.*

Douglas Adams, The Hitch Hikers Guide to the Galaxy 1979

#### Unit Learning Outcomes Addressed by this worksheet: 1 & 2

For all of the exercises below, clearly state the assertions which will be valid for each control structure used. Your pseudo code can be written in your exercise book and also electronically stored in P04 and your Java implementations should be placed in P04. Remember - design first, then code! I mean it! Really!

#### Exercise One.

Examine your algorithm for the paint coverage problem from worksheet 3. Using selection control structures, modify your algorithm so that if the input is invalid it will output an error message. This should consist of your main algorithm doing all the input and then calling a boolean sub module which will:

EXPORT back true if all the input is valid and false otherwise.

Output an error message for each item of input which is invalid.

The ONLY change to your main algorithm should be the addition of one IF-THEN which calls the boolean sub module described above.

#### Exercise Two.

Make a copy of your Java application from worksheet three and modify it so that it reflects the modifications you made to the pseudo code in exercise three.

#### Exercise Three.

Design an algorithm which inputs:

A student's final mark (0 to 100)

The number of assessments that the student completed which contributed to the final mark (0 to 5)

If the input is valid then the algorithm should use the rules below to output the student's grade. If the input is invalid then an error message should be output. Hint you will need to make use of IF-THEN-ELSE, CASE and sub modules.

Grade generation Rules:

A student who completed zero assessments should be awarded a grade of DNA.

A student who did not complete all assessments and who scored a final mark less than 50.0 should be awarded a grade of DNC-XX, where XX represents the final mark the student scored (e.g. DNC-32).

A student who completed all of the assessments but scored a final mark less than 50.0 should be awarded a grade of F-XX, where XX represents the final mark the student scored (e.g. F-47).

A student who scored a final mark greater than or equal to 50.0 should be awarded a grade of G-XX, where G represents the 10 digit of the final mark and XX represents the final mark the student scored (e.g. 7-78).

#### Exercise Four.

Think about the different categories of input for the above problem and write down a set of test inputs which cover them all.

Use them to test your algorithm and ensure it will function correctly.

#### Exercise Five.

Translate your algorithm into a Java application.