# Homework 2: Structured programming Answers

1. (a) How many lines of output will the following pseudocode program produce? [1]

 Inner \* outer loop, 3\*3 = Nine – see program homework 2 qu1.py in folder

 (b) Trace through the program and write down what is output. [4]

 FOR a = 8 to 19 step 4

 FOR b = 1 to 3

 IF a mod b >= b/3 THEN

 IF a/4 <= b+1 THEN

 OUTPUT “Homer”

 ELSE

 OUTPUT “Marge”

 ENDIF

 ELSE

 OUTPUT “Bart”

 ENDIF

 ENDFOR

 ENDFOR

bart

bart

homer

bart

bart

bart

bart

bart

homer

2. (a) Describe **three** features of structured programming. [6]

Uses top-down analysis for problem solving, identifying major tasks and breaking them down into subtasks

Tasks and subtasks are written as separate, self contained modules using local variables

Structured code is used for each module – selection, iteration and sequence are the only three structures used.

 (b) List **four** benefits of using structured programming techniques. [4]

 Programs are more easily and quickly written

 Programs are more reliable

 Programs require less time to debug and test

 Programs are easier to maintain

 Modules can be written by different people in a team, shortening development time

 Modules can be re-used in different programs

3. The following steps are followed when processing invoices for a batch of customer orders. Details such as description and price of each stock item are held on a Product file. Discounts are calculated depending on the total value of the order. Details of all sales are held on a Sales file. Customer details are held on a Customer file.

 **Open Product file, Customer file and Sales file**

 **initialise variables**

 **Read Sales file to find last invoice number**

 **for each order**

 **Read Customer file to get customer details**

 **print invoice number, customer details**

 **increment invoice number**

 **for each item on the order**

 **Input the item code, quantity**

 **look up description and price**

 **calculate price\*quantity**

 **print line of order**

 **endfor**

 **calculate overall gross total**

 **calculate discount and net price**

 **print total discount and invoice total**

 **update Sales file**

 **endfor**

 **close files**

 Draw a hierarchy chart showing the major tasks and subtasks involved. [5]

[Total 20 marks]

(Accept any reasonable solution showing tasks and subtasks)

**Process Batch**

**Get customer details, print invoice headings**

**Get product information, print order line**

**Open files, Initialise invoice number**

**Process orders**

**Close files**

**Print totals, Update sales file**