# Worksheet 2: Top-down design

**Task 1**

Pseudocode for a procedure is given below.

PROCEDURE printinfo (firstname, surname, age)

OUTPUT (“My name is ”, firstname, “ ”, surname, “ and I am ”, age, “ years old”)

ENDPROCEDURE

(a) How many parameters does the procedure **printInfo** have?

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(b) What will be printed by the following call to the procedure?

Printinfo (“Mickey”, “Mouse”, 85)

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**Task 2**

(a) Write a function called **answerYorN** to input and check the response to a question. It should be “y” or “n”. Any other response is invalid, and the function should ask the user to re-enter until a valid response is received. The value is returned by the function to the main program.

The function is called as follows:

response = answerYorN()

(b) (i) Write pseudocode for a program which passes two integers as parameters to a function. The function adds up all the numbers from the first to the last number, and passes back the total of the numbers.

The main program outputs, for example, “The total of the numbers is 7872”

(ii) The user inputs 2 and 5 for the two integers which are passed to the function. Draw a trace table to show how the variables in the function change, and what value is output in the main program.

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**Task 3**

The following program is written in Small Basic.

*'program to model the running of a lemonade stand*

CalculateCostPrice()

SetCupPrice()

**For** Day = 1 **To** 5

GetRandomTemperature()

EstimateFootfall()

GetSales()

DisplayRunningSalesTotal()

**endfor**

**Sub** CalculateCostPrice

*'Subroutine to calculate the cost of 1L of lemonade*

*'One litre = 5 cups of lemonade*

TextWindow.Write("Enter the cost in pence of a lemon: ")

Lemon = TextWindow.ReadNumber()

TextWindow.Write("enter the cost in pence of 1kg sugar: ")

*'There are 100g (one tenth of a litre) of sugar per litre of lemonade*

Sugar = TextWindow.ReadNumber()/10

TotalCost = Lemon + Sugar

CostOfOneCup = Math.Round(TotalCost/5)

TextWindow.WriteLine("")

TextWindow.WriteLine("Cost of one cup of lemonade= "+ CostOfOneCup + "p")

TextWindow.WriteLine("")

**EndSub**

**Sub** GetRandomTemperature

*'Generate a random temperature between 15 and 29*

*'to represent maximum forecast temperature, and display it*

Temperature=math.GetRandomNumber(15)+14

TextWindow.WriteLine("")

TextWindow.WriteLine ("Today's maximum forecast temperature is " + Temperature)

TextWindow.WriteLine("")

**EndSub**

**Sub** SetCupPrice

*'Ask the user to decide the price of a cup of lemonade*

TextWindow.WriteLine ("")

TextWindow.Write ("Enter the price in pence you are charging for a cup of lemonade: ")

CupPrice = TextWindow.ReadNumber()

TextWindow.WriteLine ("")

**EndSub**

**Sub** EstimateFootfall

*'Estimate number of visitors passing the stand, depending on the weather*

**If** Temperature > 20 **Then**

Footfall = Math.GetRandomNumber (300) + 199

**Else**

Footfall = Math.GetRandomNumber (200) + 49

**EndIf**

TextWindow.WriteLine ("Temperature = "+ Temperature)

TextWindow.WriteLine ("")

TextWindow.WriteLine ("Footfall: " + Footfall)

**EndSub**

**Sub** GetSales

*'Calculate number of cups sold*

BestPrice = Temperature\*3

**If** CupPrice <= BestPrice **Then**

CupsSold = Math.Round(Footfall \*0.2)

**ElseIf** CupPrice <= 1.5\*BestPrice **then**

CupsSold = Math.Round(Footfall \*0.1)

**ElseIf** CupPrice <= 2\*BestPrice **then**

CupsSold = Math.Round(Footfall \*0.05)

**Else**

CupsSold = Math.Round(Footfall \*0.01)

**EndIf**

**Endsub**

**Sub** DisplayRunningSalesTotal

*'Calculate and display total sales and profit in £ so far*

SalesValue = (CupPrice \* CupsSold)/100

Profit = SalesValue-(CostOfOneCup \* CupsSold)/100

TextWindow.WriteLine ("")

TextWindow.WriteLine ("Number of cups sold = "+ CupsSold)

TextWindow.WriteLine ("Sales Value = £"+ SalesValue)

TextWindow.Writeline ("Profit = £"+ Profit)

RunningTotalSales=RunningTotalSales+SalesValue

TextWindow.WriteLine ("")

TextWindow.Writeline ("Running total of sales = £"+ RunningTotalSales)

TextWindow.WriteLine ("")

RunningTotalProfit=RunningTotalProfit + Profit

TextWindow.Writeline ("Day "+ Day)

TextWindow.Writeline ("Running total of profit = £"+ RunningTotalProfit)

TextWindow.WriteLine ("")

TextWindow.WriteLine("Press Enter to continue")

Pause = TextWindow.Read()

**EndSub**

(a) (i) Underline all the calls to subroutines (subprograms).

(ii) What is the first line output when the program is run?

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(iii) Highlight or circle all the subroutine definition statements in the code.

(b) Find **six** built-in functions used in the program. List them below and explain briefly their purpose.

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| **Function name** | **Purpose** |
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(c) Draw a structure diagram to show the sub-tasks performed in the program.

Model a lemonade stand