In-Session Exercises for Class 23 – John Calder's class.  
Students in other classes are welcome to use these as extra study.

John is away on leave on Wed, 09 May.  
This is worksheet PART B for the class to work on.

John's students need to hand-in their Part B exercises to Canvas by Wed midnight to be marked in the register   
as present in class or present online.

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WARNING about Microsoft Word and programming code.  
Programming code is plain text. Microsoft Word sometimes changes plain text to more elaborate text.  
John Calder has changed the settings in his Microsoft Word to plain text options.  
We recommend you do the same.

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FLOWCHARTS

Back to the Programming for education example.  
Here is the code for the improved version.

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| # Example 2 - Python Example02\_Quiz Improved with Random Numbers  # 20180507 JPC John Calder  # Random number methods are an extra resource  # that we "import"  from random import \*  # Information for this comes from Google Search  # "python random number generator" which leads to useful web page:  # https://pythonspot.com/random-numbers/  print("You can learn Maths with this program.")  a = randint(0, 10)  b = randint(0, 10)  # Note the need to convert a and b to strings  # to show them to the user  c\_string = input("What is " + str(a) + " x " + str(b) + " ? ")  c = int(c\_string)  if c == a \* b :  print("Well done! " + c\_string + " is the correct answer.")  else:  print("Not correct. Please try again.")  input("Press any key to exit.") |

Here is an example FLOWCHART for that.  
Reminder. We are supposed to do the flowchart first as planning for the programming.  
This case is excused by being a relatively simple program that we know and which can help us learn flowcharting for more correct use later. JPC uses MS Word shapes for this. OK to begin with to use pen and paper.

Import resource:  
random numbers

Display introduction message

Generate  
random numbers  
a and b

User inputs response to   
a times b ?

Feedback to user incorrect response

Feedback to user correct response

Correct response?

Flowchart exercise: Exercise 3-1

Create the flowchart for this improved version of the medical appointment app.

MS Word drawing tools preferred but if you hand draw it then take a photo of it with your phone and hand that in. If you cannot work out how to hand it in then email it to me instead.

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| # Example03 - Python Example03\_Screening  # 20180507 JPC John Calder  # Algorithm example based on a news story from the start of May 2018.  # Lives have been put at risk in England because a computer system has  # failed to schedule screening appointments to check for breast cancer.  # http://www.bbc.com/news/health-43975342  from sys import exit  print ("UK health emergency - person check")  gender\_check\_string = input("Is this person female? Y/N :")  if gender\_check\_string == "Y" or gender\_check\_string == "y" :  print("Female person confirmed. Now moving to the next step.")  else:  print("Not a female person. Run again to check the next person.")  input("Press any key to exit.")  exit()  # 20180507 JPC improvement  # When patients have been waiting for more than one year,  # their age increases by that wait time  wait\_string = input("How long has she been on the waiting list? ")  wait = int(wait\_string)    age\_string = input("Age of person : ")  age = int(age\_string)  if age >= 68 + wait and age <= 71 + wait :  print("This person is in the high risk category.")  print("You need to make an urgent doctor's appointment for her.")  else:  print("This person is not in the high risk category.")  print("Run this program again to check the next person.")  input ( "Press any key to exit." ) |

Coding exercises:

Exercise 4-1

We can estimate the cost of getting a tree chopped down in Tribnia with this formula

estimated\_cost = height \* 53

That looks easy but wait! There's more! The Tribnia Council has a rule that we are not allowed to chop down trees with a height of more than 30 metres. You need to include this in your programming.  
Create this calculator program with height as the input and estimated\_cost as the output.

Exercise 4-2 - GST tax  
In New Zealand, a 15 percent GST tax gets added to most goods and services.  
Create a program where we can input a raw cost and output the cost including GST.  
Input and Output are simple but you need to find, adapt or create a formula for percentage increase.

Exercises adapted from our e-book "The Coder's Apprentice"  
First exercise number changed from 3.1 to 4.3

Exercise 4.3  
The cover price of a book is $24.95, but bookstores get a 40 percent discount.   
Shipping costs $3 for the ﬁrst copy and 75 cents for each additional copy.   
Calculate the total cost for a bookstore of an input number of copies.

Exercise 4.4   
Can you think of a way to swap the values of two variables that does not need a third variable as a temporary storage? In the code block below, try to implement the swapping of the values of a and b without using a third variable. To help you out, the ﬁrst step to do this is already given. You just need to add two more lines of code.

exercise0404.py

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| a = 17  b = 23  print( "a =", a, " and b =", b )  a += b  # add two more lines of code here to cause swapping of a and b  print( "a =", a, " and b =", b )  input("Press any key to exit") |