University of Aberdeen, Department of Computing Science

CS1028 Practical 5

Programming for Science and Engineering

14 October, 2019

1 Questions for Beginners

Everybody should be able to answer all of the questions in this section.

1.1 Questions:

1. Compose a program that reads in integers (as many as the user enters) from standard input and writes the maximum and minimum values to standard output.

   Solution: See maxmin.py.

2. Modify your program from the previous exercise to insist that the integers must be positive (by prompting the user to enter positive integers whenever the value entered is not positive).

3. Compose a program that accepts an integer n from the command line, reads n floats from standard input, and writes their mean (average value) and standard deviation (square root of the sum of the squares of their differences from the average, divided by n). Solution: See stats2.py.

4. Extend your program from the previous exercise to create a filter that writes all the values that are further than 1.5 standard deviations from the mean.

5. Compose a program that reads in a sequence of integers and writes both the integer that appears in a longest consecutive run and the length of the run. For example, if

the input is 1 2 2 1 5 1 1 7 7 7 7 1 1, then your program should write Longest run: 4 consecutive 7s.

Solution: See longestrun.py.

6. Compose a filter that reads in a sequence of integers and writes the integers, removing repeated values that appear consecutively. For example, if the input is 1 2 2 1 5 1 1 7 7 7 7 1 1 1 1 1 1 1 1 1, your program should write 1 2 1 5 1 7 1.

7. Compose a program that accepts a command-line argument n, reads from standard input n-1 distinct integers between 1 and n, and determines the missing value.

8. Compose a program named wordcount.py that reads text from standard input and writes to standard output the number of words in the text. For the purpose of this exercise, a word is a sequence of non-whitespace characters that is surrounded by whitespace. For example, the command python wordcount $<$ tale.txt should write 139043.

   Solution: See wordcount.py.

9. Suppose that the file input.txt contains the two strings F and F. What does the following command do? See the exercises from Section 1.2 for more information on dragon curves. Here is the Python program dragon3.py.

   python dragon3.py $<$ input.txt | python dragon3.py | python dragon3.py

10. Compose a filter tenperline.py that reads a sequence of integers between 0 and 99 and writes 10 integers per line, with columns aligned. Then compose a program randomintseq.py that takes two command-line arguments m and n and writes n random integers between 0 and m-1. Test your programs with the command python randomintseq 100 200 | python tenperline.py.