

PLEASE HAND IN

UNIVERSITY OF TORONTO
FACULTY OF ARTS AND SCIENCE

MIDTERM #2

CSC 104H1

DURATION — 50 MINUTES

NO AIDS ALLOWED

PLEASE HAND IN

STUDENT NUMBER: _____

LAST NAME: _____

FIRST NAME: _____

Do NOT turn this page until you have received the signal to start.
(In the meantime, please fill out the identification section above,
and read the instructions below.)

This test consists of 3 questions on 5 pages (including this one). *When you receive the signal to start, please make sure that your copy of the test is complete.*

Please answer questions in the space provided. You will earn 20% for any question you leave blank or write "I cannot answer this question," on. You will earn substantial part marks for writing down the outline of a solution and indicating which steps are missing.

Write your student number at the bottom of pages 2-5 of this test.

1: _____/10

2: _____/26

3: _____/ 7

TOTAL: _____/43

Good Luck!

QUESTION 1. [10 MARKS]

Suppose your (ancient) computer can store 2 million non-negative whole numbers as 8-bit binary numbers, without any need for a "sign" bit.

PART (A) [2 MARKS]

How many DIFFERENT non-negative whole numbers can your machine store? Explain your answer

PART (B) [2 MARKS]

Give an example of a non-negative whole number that could not be stored on your machine. Explain why.

PART (C) [2 MARKS]

Give an example of some arithmetic operations that takes numbers that can be stored on your machine, but produces a number that cannot be stored on your machine. Explain.

PART (D) [4 MARKS]

Write 6 and 7 as binary numbers, and multiply these binary numbers. Show your work.

QUESTION 2. [26 MARKS]

Explain as much as you can of what's going on in the following Python sessions.

PART (A) [3 MARKS]

```
>>> 11/3 > 9/3
```

```
False
```

PART (B) [2 MARKS]

```
>>> 'okkee' in 'bookkeeper'
```

```
True
```

PART (C) [6 MARKS]

```
>>> number1 = 5
```

```
>>> string1 = 'five'
```

```
>>> number1 = string1
```

```
>>> string1 = number1
```

```
>>> type(number1)
```

```
<type 'str'>
```

```
>>> type(string1)
```

```
<type 'str'>
```

PART (D) [6 MARKS]

```
>>> numList = [2,3,5,7,11]
>>> wordList = ['two', 'three', 'five', 'seven', 'eleven']
>>> numList[1] = wordList[2]
>>> wordList[2] = numList[2]
>>> numList
[2, 'five', 5, 7, 11]
>>> wordList
['two', 'three', 5, 'seven', 'eleven']
```

PART (E) [9 MARKS]

```
>>> list1 = ['basil', 'olive oil', 'pine nuts', 'garlic']
>>> list2 = ['lentils', 'salt', 'tumeric', 'water']
>>> recipe = {'pesto': list1, 'dal' : list2}
>>> recipe['pesto'].append(recipe['dal'][3])
>>> recipe['pesto']
['basil', 'olive oil', 'pine nuts', 'garlic', 'water']
```

QUESTION 3. [7 MARKS]

PART (A) [4 MARKS]

What is the maximum number of regions you can divide a sheet of paper into with 7 straight lines? Explain your answer (a formula doesn't count as an explanation).

PART (B) [3 MARKS]

Suppose that you correctly filled in the code for *lazyLit.py* from Assignment 2, but inadvertently replaced the contents of the file *alice30.txt* with a list of all the different surnames in the Toronto phonebook. The names occur in alphabetical order, and there are no duplicate names. What is the result of the following Python session? Explain why.

```
>>> import lazyLit
>>> bookTable = {}
>>> lazyLit.buildTable('alice30.txt', 3, bookTable)
>>> lazyLit.useTable(100, 3, bookTable)
```

Total Marks = 43