THE UNIVERSITY OF MANITOBA
COMP1012: Computer Programming for Scientists & Engineers
Midterm In Class Exam (A02—Boyer)
2016 October 28, 12:30

Name	Student Number

Time: 50 minutes

Instructions:

1. Answer all questions on this paper. For multiple choice questions, circle the letter of the ***best*** or most complete choice. For short answer questions, write your answer in the space provided.
2. Extra work space is available on page 3.
3. You will find a Python Guide along with your midterm; ask if you don't have one. You may ***not*** use your own copy. No other aids (such as calculators or cell phones) are permitted.
4. You have 50 minutes to complete the exam.

Marks for Part 1	Part 2A	Part 2B	Part 3	Total
/ 4	/ 4	/ 4	/ 4	/16

Part 1: Predict the output [4 x 1 mark]

In each row of the table below, mentally execute the code on the left and enter the expected output in the box on the right. Each table row is separate. Use the space below for scrap work.

	Code Fragment	*Expected output*
A.	`print(4 + 1 % 1 // 1)`	
B.	`print(list(range(3,0,-2)))`	
C.	`print(3 or 3 != 4 / 1)`	
D.	`print([0, 1, 2, 3][-3:4])`	

Work space:

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Part 2: Write a program [Total 8 marks]

Complete the script for the function **`bigExp(xx)`** that evaluates the terms in the series below for approximating e^x to 25 digits of precision. It returns the result as the integer value $10^{25}e^x$. Declare a suitable constant for the digits of precision.

Series:

$$10^{25}e^x = 10^{25} + 10^{25}x + \frac{10^{25}x^2}{2!} + \frac{10^{25}x^3}{3!} + \cdots$$

Next, add code (it does not have to be in a function, but it can if you like) that calls your bigExp function to produce the table of results shown.

NOTE: You can't use floating-point division to obtain the final result for exp(x), since that only produces 16 decimal places of precision.

```
x   exp(xx)
0   1.0
1   2.7182818284590452353602862
2   7.3890560989306502272304258
3  20.855369231876677409285281
4  54.598150033144239078110258 9
```

Details:

- You do NOT need standard comments to start your program, nor termination output at the end.
- Use well-named constants and variables for values.

```
def bigExp(xx):
```

Page intentionally left blank (apart from this line); test continues on next page

Part 3: Circle the letter of the *best* answer, or provide the required answer [4 x 1 mark]

A. Given: `xx = 1`, which print statement would produce `There is 1 item`?

a) `print("There %s %d item%s" % (("are", "is")[xx != 1], xx, ("s", "")[xx != 1]))`
b) `print("There %s %d item%s" % (("are", "is")[xx == 1], xx, ("s", "")[xx == 1]))`
c) `print("There %s %d item%s" % (("are", "is")[xx == 0], xx, ("s", "")[xx == 0]))`
d) `print("There %s %d item%s" % (("is", "are")[xx == 1], xx, ("", "s")[xx == 1]))`
e) `print("There %s %d item%s" % (("are", "is")[xx > 1], xx, ("s", "")[xx > 1]))`

B. Which of the following statements about calling functions is FALSE?

a. A function call must always appear on the right-hand side of an assignment statement.
b. A function call must always include brackets after the function's name.
c. The arguments of a function call may include variables, literal values or other function calls.
d. The arguments of a function call are matched one-to-one with the parameters in the function definition.

C. Given `xx = 4`, `yy = 2`, `zz = 2.0`, which print statement would produce `<class 'int'>`?

a) `print(type(xx // zz))`
b) `print(type(yy / yy))`
c) `print(type(yy // zz))`
d) `print(type(zz // zz))`
e) `print(type(xx // yy))`

D. Using good coding practices and the same rules as QuizMaster, write a Python expression to evaluate this math expression, assuming math has already been imported:

$$\ln\left(\left(10+\cos\left(|x|\right)\right)\cdot\sin\left(3\right)\cdot\left(10^{3}\right)\right)$$

Put expression here