

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.

	<i>Code Fragment</i>	<i>Expected output</i>
A.	What is printed by <code>print(2 / 2 + 3 / 1) ?</code>	
B.	What is printed by <code>print(tuple(range(1,-3,-2))) ?</code>	
C.	What is printed by <code>print(1 // 4 and 1 / 4) ?</code>	
D.	What is printed by <code>print(2 + 1 != 1 < 2) ?</code>	

Work space:

Part 2: Write a program [Total 8 marks]

2. [8 marks] A friend has described to you a strange function that has this infinite series:

$$f(x) = \frac{x}{1!} - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

She speculates that $f(x) \equiv \sin(x)$. Write a complete program to print out the table of values shown to the right, to compare the two functions. In evaluating the series, sum all terms that are at least 10^{-16} in absolute value and only those terms. In comparing the function values, use a comparison tolerance of 10^{-13} .

put imports here

global constants here

EPS1 =

EPS2 =

def main() : # put your code for the table here

def fnc(xx) : # your code to return the series sum

TESTING SIN SERIES			
x[rad]	sin(x)	f(x)	Equal
0.1	0.0998334166468	0.0998334166468	True
0.2	0.1986693307951	0.1986693307951	True
0.3	0.2955202066613	0.2955202066613	True
0.4	0.3894183423087	0.3894183423087	True
0.5	0.4794255386042	0.4794255386042	True
0.6	0.5646424733950	0.5646424733950	True
0.7	0.6442176872377	0.6442176872377	True
0.8	0.7173560908995	0.7173560908995	True
0.9	0.7833269096275	0.7833269096275	True

For marker use only	
Item	Mark
A	
B	
C	
D	
E	
Sum	

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

A. Given the following lines have just been executed, which of the options below creates a list of all numbers from seq1 that contain the digit '3', and only those numbers?

```
seq1 = [-3, 4, -4, -5, 4, 0, 1, -4, 3, -3]
seq2 = []

a) for num in seq1: seq2.append((num % 3 == 0) * num)
b) for num in seq1: seq2 = [num] * (num % 3 == 0)
c) for num in seq1: seq2 += [num] * (num % 3 == 0)
d) for num in seq1: seq2 += [num] * ('3' in str(num))
e) for num in seq1: seq2 = [num] * ('3' in str(num))
```

B. Which of the following does NOT print "any_banana" given this definition?

```
string = "any banana"

a) string.replace(' ', '_'); print(string)
b) print(string[:3] + '_' + string[4:])
c) print(string.replace(" ", "_"))
d) print('_'.join(string.split()))
e) strList = list(string); strList[3] = '_'; print(''.join(strList))
```

C. Which of the following statements about tuples, lists and strings is false, assuming seq is a tuple, a list or a string that is large enough to make the expressions valid?

- a) seq[-2] is the second last item if seq is any of these data types.
- b) bool(seq[3:3]) is False for any of these data types.
- c) 2 * seq is twice the length of seq for any of these data types.
- d) seq[2] is the second item if seq is any these data types.
- e) seq += seq doubles the size of seq for any of these data types.

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:

$$\ln \left(\left[\sin \left(\tan \left(\log_{10} (5) - \frac{|b|}{-5} \right) \right) \right] \right)$$

Put expression here