ChEn-3170: Computational Methods in Chemical Engineering Spring 2020 UMass Lowell; Prof. V. F. de Almeida **04Mar20**

Mid-term Exam 04Mar20

Name:

Guidance:

- This is a closed-book, closed-note, individual exam.
- On-line mobile devices are not allowed.
- You may use an off-line, simple calculator without linear algebra functions, that does not store documents or notes.
- You may use scratch paper if you wish (paper will be provided).
- All pages must be submitted with your completed exam.
- Make sure to answer the question asked.
- Show your work and be clear.

Rubric Panel

Score	Value	Now Showing (2pm to 2:50pm)	Preview No.
	15	Global Warming	<u>1</u>
	15	First Gear	<u>2</u>
	50	Don't Panic	<u>3</u>
	20	<u>OMG</u>	<u>4</u>
	100	Total	

Preview Problem 1 (15 pts)

Write an example for all basic data types in Python by creating a variable and assigning the data type as you would do in a Jupyter notebook cell. Make sure to write down the names of the data types as a comment.

```
In [ ]:
'''1) Basic data types'''
```

Preview Problem 2 (15 pts)

Write an example for all basic Python data structures by assigning a variable to the data structure as you would do in a Jupyter notebook cell. Make sure to write down the names of the data structures as a comment.

```
In [ ]:
 '''2) Basic data structures'''
```

Preview Problem 3 (50 pts)

Given the following reaction mechanism

rxn 1: $2A + B \longrightarrow C$

 $rxn 2: B + C \longrightarrow A$

 $rxn 3: A + 2C \longrightarrow B$

rxn 1: $2A+B \longrightarrow C$

 $rxn 2: B+C \longrightarrow A$

rxn 3: $A+2C \longrightarrow B$

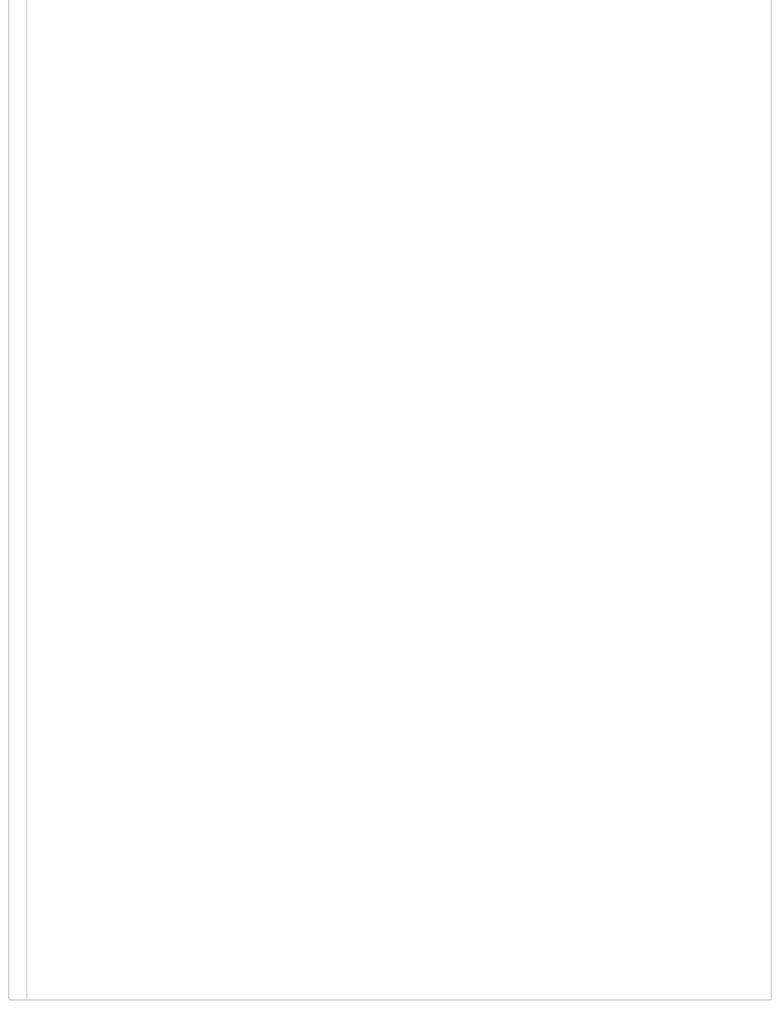
and the following species production rate density [mol/(s L)] for species A, B, C as follows: -5, 2, 1, respectively,

- 1. Compute the reaction rates density for the corresponding reactions listed above compatible with the given production rates,
- 2. Prove quantitatively whether you can or cannot find other reaction rates for the same production rates.

```
In [ ]:
```

```
'''3.1 Reaction rates density'''
```

In []:	
'''3.2 Alternative reaction rates density'''	



Preview Problem 4 (20 pts)

Demonstrate quantitatively whether the reaction mechanism in Problem 3 is valid or invalid.

```
In [ ]:
'''4) Demonstrate validity of mechanism in Problem 3'''
```

