UGANDA TECHNOLOGY AND MANAGEMENT UNIVERSITY
SCHOOL OF COMPUTING & ENGINEERING
END OF SEMESTER EXAMINATIONS

COURSE NAME: Mobile Cloud Computing

COURSE CODE: CS 509

DATE: 17th December 2021

TIME: 5:00- 8:00pm

Duration: 3 Hours*****

REGNO: MAY21/COMP/563U

QUESTIONS ATTEMPTED : ONE, TWO, THREE AND FOUR

Question One

a) Write one line of code in Input (In[1]) that can generate the output seen in input(In[2]). (**Hint**: Submit in the screen shot of your codes). **(8 marks)**

```python
import numpy as np
```

b) Write one line of code in Input (In[3]) . Hence run codes line 4 and 5. (**Hint**: Submit in the screen shot of your codes). **(8 marks)**

```python
import time
```

```python
A = np.random.rand(1000000)
B = np.random.rand(1000000)
tic = time.time()
c = np.dot(A, B)
toc = time.time()
print(c)
```

```
249954.6352838106
```

```python
print("vectorized version: " + str(1000*(toc-tic)) +"ms")
```

```
vectorized version: 1.4300346374511719ms
```

c) Write one line of code in input (In[6] and run the codes to produce outputs. (**Hint**: Submit in the screen shot of your codes). **(8 marks)**

```
D = 0
tac = time.time()
for i in range(1000000):
    D +=A[i]*B[i]
toc = time.time()
print(c)
print("For loop:" + str(1000*(toc-tac)) + "ms")
```
    249954.6352838106
    For loop:1208.3365917205811ms

d) Explain why the output of input (In[5]) produces a smallest value. **(8 marks)**

This is because the time between the two-time intervals; toc and tic is very small. Python runs line by line in the interpreter, It therefore takes milliseconds to execute tic and then after toc. Therefore, the difference becomes very small.

e) Explain why every time you run the codes you get various outputs. **(8 marks)**

This is because time changes. So every time the code is executed the value of time.time() is different hence the output changes as time moves.

Section B (60 Marks)

Study the Layered architectural development of the cloud platform for IaaS, PaaS and SaaS applications over the Internet. Use it to answer questions **Two** and **Three:**

Question Two

(a) Explain the characteristics of the following clouds platforms:
  i. Public Clouds**. (4 marks)**
  Public clouds is a type of cloud that's allows services and infrastructure to be accessed by the general public. The following are the characteristics of a public cloud;
    - Involves resource pooling.
    - On-demand computing.
    - Self-service provision.
    - Pay-per use pricing.
    - It's a measured service.
    - There is broad network access.

  ii. Community Clouds. **(4 marks)**

  This allows system and services to be accessible by group of organizations. The following are the characteristics of community cloud;
    - It is a cloud solution for specific business communities.
    - Its designed to meet designed to meet community needs.
    - Allows sharing among organizations.

  iii. Private Clouds. **(4 marks)**
  This allows systems and infrastructure to be accessible within an organization. It offers increased security because of its private nature. The following are the characteristics of a private cloud;
    - It is scalable. There are high levels of utilization through virtualization, and the size and maturity of data centers.
    - It is readily accessible and customers can do self-provision.
    - Its elastic where appearance of infinite capacity on demand.
    - Shared capabilities hence workloads are multiplexed, capacity is pooled.
    - Metered consumption with ability to pay for use with no commitment.

(b) Give **two** examples of well-known:

    i.   Public Clouds. **(2 marks)**
- Gmail
- Amazon web services
- IBM Cloud
- Oracle Cloud

    ii.   Community Clouds. **(2 marks)**
- U.S.-based dedicated IBM
- SoftLayer cloud for federal agencies.

    iii.   Private Clouds, **(2 marks)**
- Hewlett Packard Enterprise (HPE)
- VMware
- Dell
- Oracle
- IBM

    iv.   Hybrid Clouds. **(2 marks)**
- Amazon Web Services
- Microsoft
- Google
- Cisco
- NetApp

Total 20 Marks

Question Three

a) The architecture of a cloud is developed at three layers: infrastructure, platform and application. Explain the following models:
    i.   Infrastructure as a Service (IaaS). **(4 marks)**
        IaaS also known as Hardware as a Service (HaaS) is a computing infrastructure managed over the internet. In this layer a third-party provider hosts infrastructure components, such as servers and storage, as well as a

virtualization layer. The IaaS provider offers virtualized computing resources, such as VMs, over the internet or through dedicated connections.

The main advantage of using IaaS is that it helps users to avoid the cost and complexity of purchasing and managing the physical servers.

ii. Platform as a Service (PaaS). **(4 marks)**

PaaS cloud computing platform is created for the programmer to develop, test, run, and manage the applications, Under PaaS a third-party provider delivers hardware and software tools usually those needed for application development, including operating systems to its users as a service.

iii. Software as a Service (SaaS). **(4 marks)**

SaaS also known as "on-demand software". Is a software in which the applications are hosted by a cloud service provider. In SaaS a third-party provider hosts applications and makes them available to customers over the internet.

Therefore users can access these applications with the help of internet connection and web browser.

b) Give **two** examples of well-known:

    i. IaaS. **(2 marks)**
- DigitalOcean
- Linode, Amazon Web Services (AWS)
- Microsoft Azure
- Google Compute Engine (GCE)
- Rackspace
- Cisco Metacloud.

    ii. PaaS. **(2 marks)**
- AWS Elastic Beanstalk
- Windows Azure,
- Heroku, Force.com
- Google App Engine
- Apache Stratos
- Magento Commerce Cloud
- OpenShift.

    iii. SaaS. **(2 marks)**
- BigCommerce

- Google Apps
- Salesforce
- Dropbox
- ZenDesk
- Cisco WebEx
- ZenDesk
- Slack,
- GoToMeeting.

c) Outline two common characteristics of Virtual Machines in distributed cloud computing.
   (2 marks)

- Increased Security.
- Managed Execution.
- Sharing

Question Four

a) Explain the expected output when the following command is executed in a numeric data frame (df) in python. **(3 marks)**

```
In [12]: df.describe()
```

The describe() method is used for calculating statistical data like percentile, mean and std of the numerical values of the Series or DataFrame. It analyzes both numeric and object series and also the DataFrame column sets of mixed data types.

It is used to generate descriptive statistics that summarize the central tendency, dispersion and shape of a dataset's distribution.

b) To build and train a model using human cell records, and classify cells to whether the samples are benign or malignant, you are required to write 3 lines of codes in input (In[19]) to produce output in line Out[26] and plot graphs where necessary. The data set was downloaded from URL:
https://s3-api.us-geo.objectstorage.softlayer.net/cf-courses-data/CognitiveClass/ML0101ENv3/labs/cell_samples.csv

Importing Needed packages

```
In [19]:  # Write 3 lines of codes
          # CODE STRAT HERE



          # CODE END HERE
          import pylab as pl
          import scipy.optimize as opt
          from sklearn import preprocessing
          from sklearn.model_selection import train_test_split
          %matplotlib inline
```

```
In [20]:  #Click here and press Shift+Enter
          !wget -O cell_samples.csv https://s3-api.us-geo.objectstor
```

```
In [26]:
          cell_df = pd.read_csv("cell_samples.csv")
          cell_df.head()
```

Out[26]:

	ID	Clump	UnifSize	UnifShape	MargAdh	SingEpiSize	BareNuc	BlandChrom	NormNucl	Mit	Class
0	1000025	5	1	1	1	2	1	3	1	1	2
1	1002945	5	4	4	5	7	10	3	2	1	2
2	1015425	3	1	1	1	2	2	3	1	1	2
3	1016277	6	8	8	1	3	4	3	7	1	2
4	1017023	4	1	1	3	2	1	3	1	1	2

(**Hint.** Submit in the screen shot of your codes.)   (**12 marks**)

Answer

```
import pandas as pd
import matplotlib.pyplot as plt


import pylab as pl
import scipy.optimize as opt
from sklearn import preprocessing
from sklearn.model_selection import train_test_split
%matplotlib inline
```

```
!wget 0- cell_samples.csv https://s3-api.us-geo.objectstorage.softlayer.net/cf-courses-data/CognitiveClass/ML0101ENv3/labs/cell_samples.csv
```

```
--2021-12-17 16:37:26--  http://0-/
Resolving 0- (0-)... failed: Name or service not known.
wget: unable to resolve host address '0-'
--2021-12-17 16:37:26--  http://cell_samples.csv/
Resolving cell_samples.csv (cell_samples.csv)... failed: Name or service not known.
wget: unable to resolve host address 'cell_samples.csv'
--2021-12-17 16:37:26--  https://s3-api.us-geo.objectstorage.softlayer.net/cf-courses-data/CognitiveClass/ML0101ENv3/labs/cell_samples.csv
Resolving s3-api.us-geo.objectstorage.softlayer.net (s3-api.us-geo.objectstorage.softlayer.net)... 67.228.254.196
Connecting to s3-api.us-geo.objectstorage.softlayer.net (s3-api.us-geo.objectstorage.softlayer.net)|67.228.254.196|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 20675 (20K) [text/csv]
Saving to: 'cell_samples.csv'

cell_samples.csv    100%[===================>]  20.19K  --.-KB/s    in 0.1s

2021-12-17 16:37:27 (207 KB/s) - 'cell_samples.csv' saved [20675/20675]

FINISHED --2021-12-17 16:37:27--
Total wall clock time: 0.8s
Downloaded: 1 files, 20K in 0.1s (207 KB/s)
```

```
cell_df = pd.read_csv("cell_samples.csv")
cell_df.head()
```

']:

	ID	Clump	UnifSize	UnifShape	MargAdh	SingEpiSize	BareNuc	BlandChrom	NormNucl	Mit	Class
0	1000025	5	1	1	1	2	1	3	1	1	2
1	1002945	5	4	4	5	7	10	3	2	1	2
2	1015425	3	1	1	1	2	2	3	1	1	2
3	1016277	6	8	8	1	3	4	3	7	1	2
4	1017023	4	1	1	3	2	1	3	1	1	2

c) Write the following codes to produce the graph below and explain the shape of the graph
(5 marks)

Answer

```
In [53]: ax = cell_df[cell_df["Class"]== 4][0:50].plot(kind='scatter',x ='Clump', y = 'UnifSize',color='DarkBlue', label='Malignant');
         cell_df[cell_df["Class"]== 2][0:50].plot(kind='scatter',x ='Clump', y = 'UnifSize',color='Yellow', label='benign', ax=ax);
         plt.show()
```
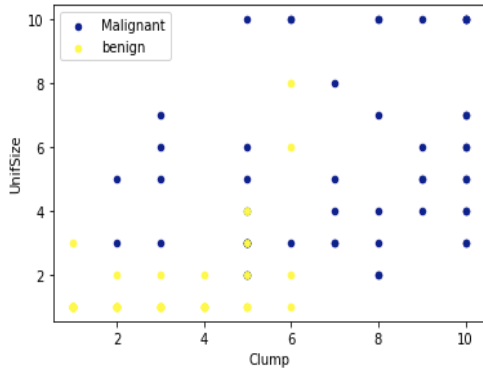

The graph show a scatter diagram showing moderate, positive linear association between Clum and Unifsize variables.