Name and UTEID:

- You are allowed 100 mins.
- Open book/notes/web—you cannot message anyone in any form.
- Write your answers on the exam.
- Show your work and give explanations.

Question:	1	2	3	4	5	6	7	8	9	10	Total
Points:	25	5	10	10	6	10	12	6	10	6	100

25 marks 1. Expect approximately 25 marks worth of questions from material that was covered in Test 1.

5 marks 2. Program analysis

The time complexity of the Sedgewick-shellsorting algorithm (SSA) is $O(n^{4/3})$, where n is the length of the input array. Suppose it takes 200ms for your implementation of SSA to sort an array of length 10000. How long do you expect it will take to sort an array of length 100000? State your assumptions.

10 marks 3. Describe the difference between the following two programs for retrieving romeo.txt:

Program 1:

```
import socket

mysock = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
mysock.connect(('www.py4inf.com', 80))
mysock.send('GET http://www.py4inf.com/code/romeo.txt HTTP/1.0\n\n')

while True:
    data = mysock.recv(512)
    if ( len(data) < 1 ) :
        break
    print data

mysock.close()
```

Program 2:

```
import urllib

fhand = urllib.urlopen('http://www.py4inf.com/code/romeo.txt')
for line in fhand:
   print line.strip()
```

10 marks 4. Using web services

Write the json string for X as it is after the code below is executed:

```
Z = [3.14, 2.71]
X = [1,2,"abc"]
Y = {"foo":[1,2], "bar":Z}
X.append(Y)
```

6 marks 5. Databases

What is a foreign key? Given an example of its applicability.

10 marks 6. Visualizing data

How would you design way to associate places with new stories automatically, and overlap the stories on a map?

12 marks 7. Automating common tasks

Write a program to find all files ending in the suffix "zip" in the current working directory, and all its subdirectories greater than 1MB. Print the names (including the path) and sizes of the files.

6 marks 8. iPython

List three benefits of iPython over the bare Python interpreter

10 marks 9. NumPy

Describe how to use numpy to compute how long a random +/-1 walk takes to get to 100 steps away from 0

6 marks 10. Pandas

Describe an application that pandas is suitable for.