Name and UTEID:

- Open book/notes/web—you cannot message anyone in any form.
- Write your answers on the exam.
- Show your work and give explanations.
- If you feel a question is ambiguous, make reasonable assumptions and state them clearly.

Question:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Points:	4	4	4	12	4	9	12	4	12	12	5	10	2	6	3	103

4 marks 1. Why are nested conditionals bad coding style? The code below is an example of a nested conditional. Rewrite it so that it is not nested.

```
if x == y:
    print 'x and y are equal'
else:
    if x < y:
        print 'x is less than y'
    else:
        print 'x is greater than y'
```

4 marks 2. What design rule in Python causes the following code to fail? How should you add a sequence as a key in a dictionary?

```
A = dict()
A[[1,2]] = 3
```

4 marks 3. State two benefits to using functions.

12 marks 4. Implement the following function. State your assumptions, and limitations of your implementation.

```
# The input argument text is string-valued. Return the distinct zip codes in text,
# along with the number of times they occur. You should support 5 digit zip codes
# (e.g., 94210) and 9 digit zip codes (e.g., 78712-3413).
def computeZipFrequencies(text):
  # choose any format for returned value
```

4 marks

5. Give one problem that asymptotic analysis solves, and one shortcoming of asymptotic analysis.

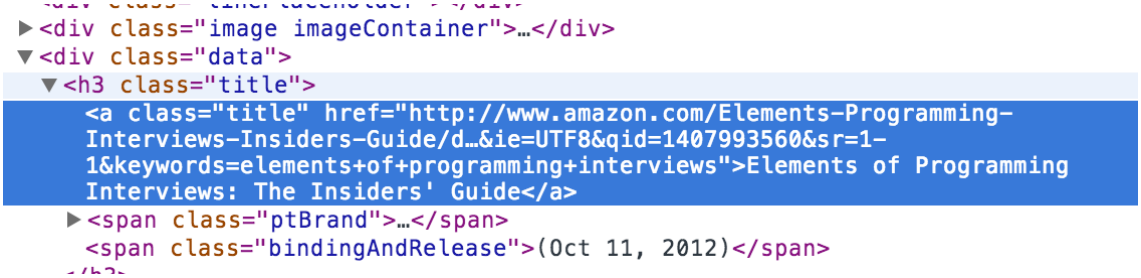
9 marks

6. Write a function that takes as argument a string, assumed to be a URL, and returns the title of the HTML page at that URL.

   You can assume that the URL is valid, that it references an HTML page, and that the page title is present in the form of a string that is delineated by `<title>` and `</title>`.

12 marks

7. The figure below shows the result of running the Chrome inspector on one of the results returned by searching for "Elements of Programming Interviews" on Amazon.com. The actual URL for the returned result is long and complicated, but you can take it to be of the form `amazon.com/search?Elements%20of%20Programming%20Interviews`.



Supposed you were asked to write a program which takes a search term and returns all the books at Amazon.com which match that search term. Describe how you would use BeautifulSoup to do this. Touch upon the central ideas, and potential pitfalls.

4 marks 8. Write a JSON string that represents A after the code below is executed:

```
A = [3.14, 2.71]
B = [1,2,"abc"]
C = {"foo":[1,2], "bar":B}
A.append(C)
```

12 marks

9. Describe tables for products and sales that would be appropriate for a database used in an e-commerce website. Do this through drawing the tables, specifically sample rows and columns. Show the role of logical, primary, and foreign keys. (Keep it simple, a few columns should suffice.)

12 marks 10. Suppose you are asked to design a display for the entrance to BazaarVoice's (BV) corporate headquarters. BV operates a service by which anyone can write short textual reviews on products.

Your display should show items that have recently been reviewed, and where they are being reviewed. It should update periodically. Mention services and libraries that you would use.

5 marks 11. Write a program to find all files ending in the suffix "png" in the current working directory, and all its subdirectories. Print the names (including the path) and sizes of these files.

10 marks 12. Explain what the program below is doing and how it's doing it. (Source is at `bit.ly/1nRjYpb` if you want to try it out.)

```
import numpy as np

trialLength = 10
numTrials = 4

unifProbs = np.random.rand(numTrials,trialLength)

stepMatrix = np.where(unifProbs > 0.5, 1, -1)

for i in range(trialLength):
    stepMatrix[:,i] = stepMatrix[:,i]*(i+1)

state = np.zeros(numTrials)

for j in range(trialLength):
   newState = state + stepMatrix[:,j]
   state = newState

Threshold = 20
Succesful = (abs(state) > Threshold)
print sum(Succesful)
```

2 marks 13. Give one reason why you might choose to write a program using pandas rather than writing it in pure Python.

6 marks 14. The following code uses pandas, specifically `DataFrame`.

```
frame = DataFrame(np.random.randn(4, 3), columns=list('bde'), \
  index=['Utah', 'Ohio', 'Texas', 'Oregon'])
f = lambda x: x.max() - x.min()
frame.apply(f, axis = 1)
frame
```

The program prints the follwing value for `frame`:

```
Utah      2.159826
Ohio      2.723120
Texas     0.453876
Oregon    2.661365
dtype: float64
```

Explain the output.

15. Roadmap

1 marks (a) Suggest two improvements to the class.

1 marks (b) What are two things you liked and would keep the same?

1 marks (c) What two things do you think you will remember most from the class 20 years from now?