CS 177

Analysis of Midterm 2 Questions
Tuples, Dictionaries and Sets

Week 13
Announcements
ANY QUESTIONS?
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Q4. Do the following two programs print the same set of numbers?

Program 1)
i = 0
while i < 5:
    if (i%2) == 0:
        i = i+1
    print(i)

Program2)
for i in range(5):
    if (i%2) == 0:
        i = i+1
    print(i)

A) Yes
*B) No
Q5.
The following code was written to find the smallest number in a list of numbers:

```python
def myMin(L):
    m = L[0]
    for k in range(1,len(L)):
        if L[k] < m: m = L[k]

Is it correct?

A) Yes
*B) No
Q7.
The following code prints None.

```
print('abracadabra'.rfind("ar"))
```

A) True
*B) False
Q8.
What is the value of L after executing the following code:

L = [1,2,4]
L.insert(5,2)

A)  [1,2,5,4]
B)  [1,5,2,4]
*C)  [1,2,4,2]
D)  [1,2,5]
Q9.
What is the value of L after executing the following statement?

L = [3* [1,1,1]]

*A)  [[1,1,1,1,1,1,1,1,1,1,1,1]]
B)  [[1,1,1],[1,1,1],[1,1,1]]
C)  [3,3,3]
D)  [[3,3,3], [3,3,3], [3,3,3]]
Q13.
What does the following print?

```python
if 'False': print(1)
if False: print(2)
if eval('False'): print(3)
```

*A) 1
B) 1, then 2
C) 2
D) 2, then 3*
Q14.
What does the following code print?

```python
a = [1,2,3,4]
b = a
a[1] = 5
print(b)
```

A) [5,2,3,4]
B) [1,2,3,4]
*C) [1,5,3,4]
D) [5,1,2,3]
Q16. Let $T = [1, [2, 3], [4, [5, 6]]]$ be a tree encoding, as discussed in class. Consider the interior nodes of the tree. What is the largest number of direct descendants of any node in the tree?

A) 4  
B) 3  
*C) 2  
D) 1
Q17.
Let \( T = [1, [2, 3], [4, [5, 6]]] \)

be a tree encoding, as discussed in class. How many leaves are in the tree?
A) 1
*B) 2
C) 3
D) 4
Q19. Do the following two programs print the same string?

**Program 1)**

```python
F = open("myFile.txt",'r')
L = []
t = F.readline()
while t != '':
    L.append(t)
t = F.readline()
F.close()
print(L[0], 'done')
```

**Program 2)**

```python
F = open("myFile.txt",'r')
t = F.read()
L = t.split('\n')
F.close()
print(L[0], 'done')
```

A) Yes  
B) No
Q21.
The file Students.txt contains the following lines:

Jim 75
Alice 95
Alex 75

What will the following code print?
```python
data = open("students.txt","r")
for line in data.readline():
    print(line)
```
A) The code will cause an error
B) Jim 75
C) Jim 75
   Alice 95
   Alex 75
*D) Jim 75
   Alice 95
   Alex 75
   *
Q25.
Given the following matrix encoded column by column:
\[ M=\begin{bmatrix}14,2,98,3,\end{bmatrix},\begin{bmatrix}32,9,2,1\end{bmatrix},\begin{bmatrix}0,3,23,8\end{bmatrix}\]
\[ a=\text{len}(M) \]
\[ b=\text{len}(M[0]) \]

What are values of \( a \) and \( b \), and what do they represent?

A) 4, 3
   number of rows, number of columns
B) 3, 4
   number of rows, number of columns
C) 4, 3
   number of columns, number of rows
D) 3, 4
   number of columns, number of rows
Q27.
The exclusive or for bit strings, written ^ in Python, is defined by the table:

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

What is printed after executing the following code:
```
x = 0b00011
y = 0b10101
x = x^y
y = x^y
x = x^y
print(x,y)
```

A) 3 21
B) 22 21
C) 22 3
*D) 21 3
Tuple

- Another standard sequence data type that consist of collection of elements grouped together. Example:

  ```python
color = ('red', 'green', 'blue')
```

- Tuples are accessed the same way as list using [], except they are immutable, once initialized they can’t be modified.

```python
>>> t = ('a', 'b', 'c', 'd', 'e')
>>> t[1] = 'z'
Traceback (most recent call last): File "<stdin>", line 1, in <module>
TypeError: 'tuple' object does not support item assignment
```
Tuple as Function Return Type

- Tuples can be used as return data type of functions

```python
>>> def TupleFun():
    a = 1
    b = 2
    return (a, b)

>>> myTuple = TupleFun()
>>> print (myTuple)
(1, 2)
>>> print (myTuple[0], myTuple[1])
1 2
```

- Functions that return Tuples are different than multi value returned functions

```python
>>> def MultiReturnFun():
    a = 1
    b = 2
    return a, b

>>> x, y = MultiReturnFun()
>>> print (x, y)
1 2
```
Dictionary

• A dictionary is a collection of elements

• Each element is a **key**:value pair, Example:

  ```
  ```

• Useful operations:
  1. Test whether an element exists in dictionary
  2. Scan key, value
  3. Create dictionary by using a list of pairs
Dictionary

```python
>>> print(765 in areaCode)
False
>>> print(630 in areaCode)
True
>>> for k, v in areaCode.items():
    print(k, v)
201 NJ 210 TX 630 IL 510 CA

>>> listOfPairs = [(4, 'A'), (3, 'B'), (2, 'C')]
>>> myDic = dict(listOfPairs)
>>> print(myDic)
```
Sets

- Collections of immutable values
- Unordered
- Elements are unique

Syntax:

```
{ expr_1, expr_2, ..., expr_n }
```

Basic Operations:

- `.union(<set>)`
- `.intersection(<set>)`
- `.symmetric_difference(<set>)`
- `.difference(<set>)`
Sets

>>> A = {1, 2, 3, 4, 5}
>>> B = {10, 5, 7}

>>> A.union(B)
{1, 2, 3, 4, 5, 7, 10}

>>> A.intersection(B)
{5}

>>> A.difference(B)
{1, 2, 3, 4}

>>> B.difference(A)
{10, 7}

>>> A.symmetric_difference(B)
{1, 2, 3, 4, 7, 10}