CS101 Practice Midterm 2

- Be sure to enter your NetID and the code below on your Scantron.
- Do not turn this page until instructed to.
- There are 25 multiple choice questions worth 1 point each.
- Each multiple choice question has only one correct answer.
- There is 1 coding question worth 5 points.
- You must not communicate with other students during this test.
- No books, notes, or electronic devices allowed.
- This is a 60 minute exam.
- There are several different versions of this exam.

1. Fill in your information:

   Full Name: ________________________________
   UIN (Student Number): ______________________
   NetID: ________________________________

2. Fill in the following answers on the Scantron form:

   93. A
   94. A
   95. D
   96. C
1. (1 point) Consider the following Python program.

```python
e=list(range(6,-1,-1))
d={0:1,1:2,2:3,3:4}
for i in e:
    d[i%3]+=e[i]
x=d[1]
```

After it is run, what is the final value of x?

(A) 9
(B) 16
(C) 5
(D) 12
(E) 3
2. (1 point) Consider the following program.

```python
import numpy as np
x=np.zeros((3,3))
for i in range(3):
    for j in range(3):
        x[i][j]=i*j+i
```

After it is run, what is the final value of x?

(A) \[
\begin{bmatrix}
0 & 1 & 4 \\
1 & 2 & 5 \\
2 & 3 & 6 \\
\end{bmatrix}
\]

(B) \[
\begin{bmatrix}
0 & 1 & 2 \\
0 & 2 & 4 \\
0 & 3 & 6 \\
\end{bmatrix}
\]

(C) \[
\begin{bmatrix}
0 & 1 & 2 \\
1 & 2 & 3 \\
4 & 5 & 6 \\
\end{bmatrix}
\]

(D) None of the other answers are correct

(E) \[
\begin{bmatrix}
0 & 0 & 0 \\
1 & 2 & 3 \\
2 & 4 & 6 \\
\end{bmatrix}
\]
3. (1 point) Consider the following program:

```python
d={}  
for i,c in enumerate("ABCDEFGHIJKLMNOPQRSTUVWXYZ"):  
    d[c]=i  
x=0  
for c in "CHEWBACCA":  
    x+=d[c]
```

What is the value of `x` after this program is executed?

(A) 44  
(B) 40  
(C) 35  
(D) 77  
(E) None of the other answers are correct.
4. (1 point) Consider the following program.

```python
def f(x):
    for i in range(x):
        return x+1
    return 100
x = f(5)
```

After it is run, what is the final value of x?

(A) 5
(B) 6
(C) 100
(D) 3
(E) None of the other answers are correct.
5. (1 point) Consider the following program.

```python
import numpy as np
x=np.zeros((3,3))
for i in range(3):
    for j in range(3):
        x[i][j]=i*j+j
```

After it is run, what is the final value of x?

(A) \[
\begin{bmatrix}
0 & 1 & 4 \\
1 & 2 & 5 \\
2 & 3 & 6 \\
\end{bmatrix}
\]

(B) \[
\begin{bmatrix}
0 & 1 & 2 \\
0 & 2 & 4 \\
0 & 3 & 6 \\
\end{bmatrix}
\]

(C) \[
\begin{bmatrix}
0 & 0 & 0 \\
1 & 2 & 3 \\
2 & 4 & 6 \\
\end{bmatrix}
\]

(D) None of the other answers are correct

(E) \[
\begin{bmatrix}
0 & 1 & 2 \\
1 & 2 & 3 \\
4 & 5 & 6 \\
\end{bmatrix}
\]
6. (1 point) Consider the following exception.

```
TypeError: can only concatenate tuple (not "int") to tuple
```

Which of the following programs will throw this exception?

(A) `tuple("LAN")+len("DO")`

(B) `tuple("LAN")[len("DO")]]`

(C) `tuple("LAN")+tuple("DO")`

(D) None of the other answers are correct

(E) "LAN"+[tuple("DO")]

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7. (1 point) Consider the following 2-dimensional numpy array:

\[
\begin{bmatrix}
1 & 5 & 9 \\
2 & 6 & 10 \\
3 & 7 & 11 \\
4 & 8 & 12 \\
\end{bmatrix}
\]

Assuming it is stored in a variable named `a`, how can we index and retrieve the value 7?

(A) `a[3][2]`

(B) `a[2][1]`

(C) `a[2][3]`

(D) `a[1][2]`
8. (1 point) Consider the following incomplete function.

```python
def pal(s):
    a=list(s)
    n=len(s)
    ???
```

The function is intended to return True if and only if the input string `s` is a palindrome. A palindrome is a string that reads the same forward and backward, like “ABBA” or “RACECAR”. What should replace the three question marks to complete the function?

(A) `return a[0:n:-1]==a[n:0:1]`

(B) `return a[:n/2]==a[(n+1)/2:]`

(C) `return a==a.reverse()`

(D) None of the other answers are correct.

(E) ```python
for i in range(n):
    if a[i]!=a[n-i-1]:
        return False
return True```
9. (1 point) Consider the following program.

```python
x=0
# x+=1 # x+=1
#
#
x+=1
#
#
x+=1
```

After it is run, what is the final value of x?

(A) 4
(B) 5
(C) 3
(D) 1
(E) 2
10. (1 point) Consider the following program.

```python
def f(x):
    if x<10:
        print(x)
    else:
        print(x+1)
x=f(5)
```

After it is run, what is the final value of x?

(A) 6  
(B) 5  
(C) 4  
(D) 10  
(E) None of the other answers are correct.

11. (1 point) Consider the following program.

```python
import numpy as np
x=np.array([1,2]+[3,4])+5
```

After it is run, what is the final value of x?

(A) \[
\begin{bmatrix}
9 \\
11
\end{bmatrix}
\]

(B) \[
\begin{bmatrix}
6 & 7 & 8 & 9
\end{bmatrix}
\]

(C) \[
\begin{bmatrix}
9 & 11
\end{bmatrix}
\]

(D) \[
\begin{bmatrix}
6 & 7 \\
8 & 9
\end{bmatrix}
\]

(E) None of the other answers are correct
12. (1 point) What should replace the three question marks to produce a program that runs without throwing an exception? Note: \texttt{sin}, \texttt{cos}, and \texttt{pi} are all part of the \texttt{math} module.

???
\texttt{math.sin(pi)+math.cos(pi)}

(A) \texttt{from math import sin,cos}
\hspace{1cm} \texttt{import math}

(B) \texttt{import math as pi, as sin, as cos}

(C) \texttt{import math}
\hspace{1cm} \texttt{from math import pi}

(D) \texttt{from math import *}
\hspace{1cm} \texttt{import sin,cos}

13. (1 point) Consider the following program.

\texttt{a,b="OBI","WAN"}
\texttt{def f(a):
\hspace{1cm} \texttt{return tuple(a)}
\texttt{a,b=b,a}
\texttt{x=\',\'.join(f(b))}

After it is run, what is the final \texttt{value} of \texttt{x}?

(A) \texttt{"O","B","I"}

(B) \texttt{"W","A","N"}

(C) \texttt{"O,B,I"}

(D) \texttt{"W,A,N"}

(E) None of the other answers are correct
14. (1 point) Evaluate the following expression:

\[ \text{len(",4,5,6,7".split(','))} \]

(A) 6
(B) "4567"
(C) 22
(D) 5
(E) 4

15. (1 point) Consider the following program.

```python
x="5 4 1".split()
x=x.sort()
try:
    print(len(x))
except:
    print(type(x))
```

After it is run, what is printed by this program?

(A) list
(B) 3
(C) TypeError
(D) NoneType
16. (1 point) Consider the following program.

```python
e=[1,2,3,4,5]
d={0:0,1:0}
for a,b in enumerate(e):
    d[b%2]+=a
x=d[1]
```

After it is run, what is the final value of \( x \)?

(A) 3  
(B) 4  
(C) 6  
(D) 9  
(E) 15
17. (1 point) Consider the following program.

```python
a=[1,"2","3",0]
x=""
for e in a:
    try:
        x+=e
    except:
        x+="A"
```

After it is run, what is the final value of `x`?

(A) 'A23A'
(B) '23'
(C) '1AA0'
(D) None of the other answers are correct.
(E) 'AAAA'

18. (1 point) Consider the following exception.

```
ValueError: invalid literal for int() with base 10: "R"
```

Which of the following programs will throw this exception?

(A) "RAN"[10]"COR"
(B) 10+"RANCOR"
(C) None of the other answers are correct
(D) int("RANCOR"[0])
(E) "RANCOR"[int("10")]

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19. (1 point) Consider the following program:

```python
a=1
def f():
    return 1
    a=3
x=a+f()
```

What is the value of x after this program is executed?

(A) 4

(B) None of the other answers are correct.

(C) 2

(D) 1

(E) 3
20. (1 point) Consider the following program:

```python
d={}  
for i,c in enumerate("ABCDEFGHIJKLMNOPQRSTUVWXYZ"):  
    d[c]=i  

x=0  
for c in "HANSOLO":  
    x+=d[c]
```

What is the value of x after this program is executed?

(A) None of the other answers are correct.

(B) 93

(C) 84

(D) 62

(E) 77
21. (1 point) Consider the following program.

```python
x=[]
for j in range(0,6):
    if (j%4)==0:
        x.append("-")
    if (j%3)==0:
        x.append("*")
```

After it is run, what is the final value of x?

(A) ["-", "+"]

(B) None of the other answers are correct.

(C) ["*", "+", "+"]

(D) ["*", "+", "+"]

(E) ["-", "+", "+", "+"]
22. (1 point) Consider the following program.

```python
def rob(jon):
    jon.append("a")
    jon=jon.reverse()
    return jon

bran=["a","r","y"]
rob(bran)
```

After it is run, what is the final **value** of bran?

(A) ['a', 'r', 'y', 'a']
(B) ['y', 'r', 'a']
(C) ['a', 'r', 'y']
(D) None
(E) ['a', 'y', 'r', 'a']
23. (1 point) Consider the following program.

```python
a=list("JEDI")
for c in "EDJI":
    print(a[c])
```

What kind of exception will this program throw?

(A) None of the other answers are correct
(B) KeyError: 'E'
(C) TypeError: cannot concatenate 'str' and 'int' objects
(D) TypeError: list indices must be integers, not str
(E) SyntaxError: invalid syntax

24. (1 point) Consider the following program.

```python
a=[1,"2","3",0]
x="
for e in a:
    try:
        x+=int(e)
    except:
        x+="A"
```

After it is run, what is the final value of x?

(A) 'A23A'
(B) None of the other answers are correct.
(C) '1AA0'
(D) '23'
(E) 'AAAA'
25. (1 point) Consider the following program.

```python
import numpy as np
x=np.zeros((3,3))
for i in range(3):
    x[i][i]=1
    for j in range(3):
        if i>=j:
            continue
        x[i][j]=2
```

After it is run, what is the final **value** of x?

(A) \[
\begin{bmatrix}
1 & 2 & 2 \\
2 & 1 & 2 \\
2 & 2 & 1 \\
\end{bmatrix}
\]

(B) \[
\begin{bmatrix}
1 & 2 & 2 \\
0 & 1 & 2 \\
0 & 0 & 1 \\
\end{bmatrix}
\]

(C) \[
\begin{bmatrix}
2 & 0 & 0 \\
2 & 2 & 0 \\
2 & 2 & 2 \\
\end{bmatrix}
\]

(D) \[
\begin{bmatrix}
2 & 2 & 2 \\
0 & 2 & 2 \\
0 & 0 & 2 \\
\end{bmatrix}
\]

(E) \[
\begin{bmatrix}
1 & 0 & 0 \\
2 & 1 & 0 \\
2 & 2 & 1 \\
\end{bmatrix}
\]
The following is a coding question worth 5 points.

Be sure to write clearly and comment your code, so we can understand your answer. NOTE: Since this is the practice exam, I wrote some extra questions to help you study.

26. (5 points) Write a function add_strings that takes a single input parameter numbers which stores a list of strings. For example, numbers might be ['a', '11', '3', 'ZeroCool', '15']. Your function should calculate the sum of all of the strings representing valid integers in the input list and return the total. In our example, your function would return 29. NOTE: You may not import any modules. Your answer should be pure Python.

def add_strings(numbers):

27. (5 points) Write a function `filter_list` that takes a single input parameter `input` which stores a list of strings. For example, `numbers` might be `['Hello', 'cat', 'nachos', '5']`. Your function should return a new list (not an alias of `input`) which contains all of the strings containing exclusively lower case letters. In our example, your function should return `['cat', 'nachos']`. **NOTE:** You may not import any modules. Your answer should be pure Python.

```python
def filter_list(A,m,n):
```
28. (5 points) Write a function `total_hours` that takes a single input parameter `shifts` which stores a list of tuples. Each tuple in the list contains an employee number followed by their hours worked in a given shift. For example, `shifts` might be `[(1, 1), (2, 3), (1, 4), (2, 2)]`. This means employee 1 worked 1 hour on one shift and 4 hours another shift. Employee 2 worked 3 hours in one shift and 2 hours in another.

Your function should return a dictionary containing the total number of hours each employee worked. The keys for the dictionary should correspond to the employee numbers (the first element of each tuple.) The corresponding value should be the total number of hours they worked. In our example, the function should return `{1: 5, 2: 5}`

**NOTE:** You may not import any modules. Your answer should be pure Python.

```python
total_hours(shifts):
```

```python
    total_hours(shifts):
```