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 30 questions worth 1 point each.
- Each question has only one correct answer.
- You must not communicate with other students during this test.
- No books, notes, or electronic devices allowed.
- This is a 45 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:

   94. A
   95. D
   96. C
1. (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', 'y', 'r', 'a']
(B) None
(C) ['a', 'r', 'y', 'a']
(D) ['y', 'r', 'a']
(E) ['a', 'r', 'y']
2. (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) '23'  
(B) 'AAAA'  
(C) 'A23A'  
(D) '1AA0'  
(E) None of the other answers are correct.

3. (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")+tuple("DO")`  
(B) `tuple("LAN")+len("DO")`  
(C) "LAN"+[tuple("DO")]]  
(D) `tuple("LAN") [len("DO")]]`  
(E) None of the other answers are correct
4. (1 point) Consider the following program.

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

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

(A) 3  
(B) 4  
(C) 6  
(D) 9  
(E) 15

5. (1 point) What do we call the optimization heuristic that involves picking the best locally optimal parts of a solution to build a (possibly suboptimal) solution?

(A) Brute-force search  
(B) Simulated annealing  
(C) Random search  
(D) Greedy search
6. (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) None of the other answers are correct.
(B) 10
(C) 5
(D) 4
(E) 6

7. (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) "RANCOR"[int("10")]
(B) 10+"RANCOR"
(C) int("RANCOR"[0])
(D) None of the other answers are correct
(E) "RAN"[10]"COR"
8. (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) \[
\begin{bmatrix}
0 & 0 & 0 \\
1 & 2 & 3 \\
2 & 4 & 6
\end{bmatrix}
\]

(B) None of the other answers are correct

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

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

(E) \[
\begin{bmatrix}
0 & 1 & 2 \\
1 & 2 & 3 \\
4 & 5 & 6
\end{bmatrix}
\]
9. (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) 100  
(B) 5  
(C) 6  
(D) 3  
(E) None of the other answers are correct.

10. (1 point) Evaluate the following expression:

```
(True or False) and (True and True)
```

What value is produced?

(A) False  
(B) True
11. (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) $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

(B) None of the other answers are correct

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

(D) $\begin{bmatrix} 0 & 1 & 4 \\ 1 & 2 & 5 \\ 2 & 3 & 6 \end{bmatrix}$

(E) $\begin{bmatrix} 0 & 0 & 0 \\ 1 & 2 & 3 \\ 2 & 4 & 6 \end{bmatrix}$
12. (1 point) Evaluate the following expression:

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

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

13. (1 point) Consider the following program.

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

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

(A) 2
(B) 5
(C) 4
(D) 1
(E) 3
14. (1 point) Consider the following incomplete function.

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[:n//2]==a[(n+1)//2:]
(B) return a[0:n-1]==a[n:0:1]
(C) for i in range(n):
    if a[i]!=a[n-i-1]:
        return False
    return True
(D) None of the other answers are correct.
(E) return a==a.reverse()
15. (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) 35  
(B) 40  
(C) 77  
(D) 44  
(E) None of the other answers are correct.
16. (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) 3  
B) 12  
C) 5  
D) 9  
E) 16

17. (1 point) Which of the following lines would best simulate a roll of one dice?

(A) x=np.random.choice(np.arange(1,7))  
(B) x=np.random.shuffle(np.arange(1,7))  
(C) x=np.random.randn(np.arange(1,7))  
(D) x=np.random.rand(np.arange(1,7))
18. (1 point) Consider the following program.

```python
def tyrion(s):
    return s
return s*3
```

`s=tyrion("BRONN")`

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

(A) BBBRRROOONNN  
(B) "BRONN"  
(C) "BRONNBRONNBRONN"  
(D) "BRONN3"  
(E) None

19. (1 point) Consider the following program.

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

What kind of exception will this program produce?

(A) TypeError: cannot concatenate 'str' and 'int' objects  
(B) None of the other answers are correct  
(C) TypeError: list indices must be integers, not str  
(D) KeyError: 'E'  
(E) SyntaxError: invalid syntax
20. (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) \(a[1][2]\)

(B) \(a[3][2]\)

(C) \(a[2][1]\)

(D) \(a[2][3]\)

21. (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) '23'

(B) None of the other answers are correct.

(C) 'A23A'

(D) 'AAAA'

(E) '1AA0'
22. (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) \[
\begin{bmatrix}
2 & 0 & 0 \\
2 & 2 & 0 \\
2 & 2 & 2
\end{bmatrix}
\]

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

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

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

(E) \[
\begin{bmatrix}
2 & 2 & 2 \\
0 & 2 & 2 \\
0 & 0 & 2
\end{bmatrix}
\]
23. (1 point) Which of the following lines would best simulate shuffling a deck of cards?

(A) `x=np.random.choice(np.arange(1,53))`

(B) `x=np.random.randn(np.arange(1,53))`

(C) `x=np.random.shuffle(np.arange(1,53))`

(D) `x=np.random.rand(np.arange(1,53))`

24. (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) 1

(C) 3

(D) None of the other answers are correct.

(E) 2
25. (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) 62

(B) None of the other answers are correct.

(C) 84

(D) 93

(E) 77
26. (1 point) Consider the following program.

\[
x=[]
\]

\[
\text{for } j \text{ in range(0,6):}
\]

\[
\text{if } (j\%4)==0:
\]

\[
x.\text{append}("-")
\]

\[
\text{if } (j\%3)==0:
\]

\[
x.\text{append}("*")
\]

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

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

(B) None of the other answers are correct.

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

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

(E) ["-", ";"]
27. (1 point) Your friend is very proud of his new laptop password. In fact, he's so confident you can't
guess it, he tells you he'll give you $100 dollars if you can guess it correctly, and that you can guess as
many times as you want. You know that the password contains only letters (upper and lower case,)
and that the password is less than 10 characters long. Your friend also accidentally revealed that the
password contains no repeating characters. Let f be a function that tells you how much money a given
password is worth. The function should return 100 if the password is correct or 0 if the password is
wrong.

letters="abcdefghijklmnopqrstuvwxyz"
letters+=letters.upper()
???
print("The password is: %s" % ''.join(answer))

What should replace the three question marks to complete the program to find the input that maximizes
the function f?

(A) None of the other answers are correct.

(B) for i in range(10):
    for p in itertools.combinations(letters,i):
        if f(p)>0:
            answer=p

(C) for i in range(10):
    for p in itertools.product(letters,i):
        if f(p)>0:
            answer=p

(D) for i in range(10):
    for p in itertools.permutations(letters,i):
        if f(p)>0:
            answer=p
28. (1 point) Consider the following program.

```python
a,b="OBI","WAN"
def f(a):
    return tuple(a)
a,b=b,a
x=','.join(f(b))
```

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

(A) None of the other answers are correct
(B) "O","B","I"
(C) "W","A","N"
(D) "W,A,N"
(E) "O,B,I"

29. (1 point) Consider the following incomplete program:

```python
import itertools
x="R2D2"
???
    print(x)
```

Replacing the three question marks with which of the following will result in 'R2D2' being printed exactly once?

(A) for a in itertools.combinations(x,4):
(B) for a in itertools.combinations(x,3):
(C) for a in itertools.combinations(x,1):
(D) for a in itertools.combinations(x,2):
30. (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) \[
\begin{bmatrix}
9 \\
11 \\
\end{bmatrix}
\]

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

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

(E) None of the other answers are correct