

## CS 101 Practice Midterm #2

### 1. Fill in your information:

**Full Name:** \_\_\_\_\_

**UIN (Student Number):** \_\_\_\_\_

**NetID:** \_\_\_\_\_

- A. This test is fairly representative of the contents of the second midterm.
- B. Material from lectures through 1ec21 will be included.
- C. We will also test random distributions (uniform v. normal.)

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

95. D

96. C

1. (1 point) Consider the following program.

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

2. (1 point) Consider the following program.

```
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) ["\*", "-", "\*"]

3. (1 point) For this problem, your job is to put the lines of code below in the proper order to create a function that accomplishes a task. We will completely ignore indentation.

```
1 def is_close( a,b,atol )
2 atol = 1e-3
3 return ( abs(a-b) <= atol )
4 return ( (a-b) <= atol )
5 except:
6 def is_close( a,b,atol=1e-3 ):
7 try:
8 return None
```

The function you should write is called `is_close`, and it should accept a two numbers, `a` and `b`. An optional third argument is the relative tolerance `atol` with default value `1e-3`. `is_close` returns `True` or `False` depending on whether the numbers are closer than `atol`:

$$|a - b| \leq \text{atol} \rightarrow \text{True} \qquad |a - b| > \text{atol} \rightarrow \text{False}$$

The code should return `None` if the calculation fails (for instance, if the parameters `a` or `b` are non-numeric).

What is the proper selection and ordering of the given lines of code?

- (A) 6, 7, 3, 5, 8
- (B) 1, 2, 7, 3, 5, 8
- (C) 6, 7, 4, 5, 8
- (D) 6, 3
- (E) 1, 2, 7, 4, 5, 8

4. (1 point) Consider the following program.

```
x=0
# x+=1 # x+=1
'''
'''
x+=1
'''
'''
x+=1
```

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

- (A) 4
- (B) 3
- (C) 1
- (D) 5
- (E) 2

5. (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[1][2]
- (C) a[2][3]
- (D) a[2][1]

6. (1 point) Consider the following program.

```
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) 6
- (B) None of the other answers are correct.
- (C) 100
- (D) 3
- (E) 5

7. (1 point) Consider the following program.

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

8. (1 point) Which of the following Python programs best simulates the roll of one six-sided die in the variable `x`? (*I.e.*, any number from 1-6 inclusive is equally likely to result from the die roll or program code.)

(A) `x = np.random.uniform( np.arange( 1,7 ) )`

(B) `x = np.random.randn( np.arange( 1,7 ) )`

(C) `x = np.random.shuffle( np.arange( 1,7 ) )`

(D) `x = np.random.choice( np.arange( 1,7 ) )`

9. (1 point) Consider the following program.

```
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) 4

(C) 10

(D) None of the other answers are correct.

(E) 5

10. (1 point) Consider the following program.

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

11. (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) "LAN"+[tuple("D0")]
- (B) tuple("LAN")+len("D0")
- (C) tuple("LAN")[len("D0")]
- (D) None of the other answers are correct
- (E) tuple("LAN")+tuple("D0")



12. (1 point) Consider the following program. (N.B.: This is a tricky one!)

```
def chase( chevy ):
    chevy.append( "arrow" )
    chevy.reverse()
    chevy = chevy.sort()
    return chevy
```

```
earl = "cheviot hills".split(" ")
chase( earl )
```

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

- (A) [ 'hills', 'cheviot', 'arrow' ]
- (B) [ 'arrow', 'cheviot', 'hills' ]
- (C) [ 'hills', 'cheviot' ]
- (D) None
- (E) [ 'cheviot', 'hills', 'arrow' ]

13. (1 point) Consider the following program:

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

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

- (A) 3
- (B) None of the other answers are correct.
- (C) 1
- (D) 2
- (E) 4

14. (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) 15
- (C) 9
- (D) 4
- (E) 6

15. (1 point) Consider the following program.

```
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)  $\begin{bmatrix} 1 & 2 & 2 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$

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

(C)  $\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$

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

(E)  $\begin{bmatrix} 2 & 0 & 0 \\ 2 & 2 & 0 \\ 2 & 2 & 2 \end{bmatrix}$

16. (1 point) Consider the following program:

```
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) 84
- (B) 62
- (C) None of the other answers are correct.
- (D) 77
- (E) 93

17. (1 point) What should replace the three question marks to produce a program that runs without throwing an exception? Note: `sin`, `cos`, and `pi` are all part of the `math` module.

```
???
math.sin(pi)+math.cos(pi)
```

- (A) `import math as pi, as sin, as cos`
- (B) `from math import *`  
`import sin,cos`
- (C) `from math import sin,cos`  
`import math`
- (D) `import math`  
`from math import pi`

18. (1 point) Consider the following program.

```
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) NoneType
- (C) 3
- (D) TypeError

19. (1 point) Consider the following program.

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

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

- (A) [ 9 11 ]
- (B) None of the other answers are correct
- (C)  $\begin{bmatrix} 9 \\ 11 \end{bmatrix}$
- (D)  $\begin{bmatrix} 6 & 7 \\ 8 & 9 \end{bmatrix}$
- (E) [ 6 7 8 9 ]

20. (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) None of the other answers are correct
- (C) `int("RANCOR"[0])`
- (D) `10+"RANCOR"`
- (E) `"RANCOR"[int("10")]`

21. (1 point) Consider the following program.

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

What kind of exception will this program throw?

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

22. (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[0:n:-1]==a[n:0:1]`
- (B) `for i in range(n):  
 if a[i]!=a[n-i-1]:  
 return False  
return True`
- (C) `return a[:n/2]==a[(n+1)/2:]`
- (D) `return a==a.reverse()`
- (E) None of the other answers are correct.

23. (1 point) Consider the following incomplete Python program:

```
def tribo( n ):
    if n <= 1:
        return 1
    else:
        ???
```

The function `tribo` should return the  $n$ th number of the so-called “Tribonacci” sequence (counting from zero), in which each number is equal to the sum of the preceding three; *i.e.*,

0, 0, 1, 1, 2, 4, 7, 13, 24, 44, 81, ...

What should replace the ??? block to complete the program correctly?

- (A) `return tribo( n-1 ) + tribo( n-2 ) + tribo( n-3 )`
- (B) `return ( n - 1 ) + ( n - 2 ) + ( n - 3 )`
- (C) `return tribo[ n-1 ] + tribo[ n-2 ] + tribo[ n-3 ]`
- (D) `return tribo( n-1, n-2, n-3 )`
- (E) `return tribo( n ) + tribo( n-1 ) + tribo( n-2 )`



24. (1 point) Consider the following program.

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

(B) None of the other answers are correct

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

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

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

25. (1 point) Consider the following Python program.

```
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) 3
- (E) 12

26. (1 point) Evaluate the following expression:

```
len(",4,5,6,7".split(','))
```

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

27. (1 point) Consider the following program:

```
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) 44
- (C) 40
- (D) None of the other answers are correct.
- (E) 77

28. (1 point) Consider the following program.

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

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

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

(E) None of the other answers are correct

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