True/False

Assume questions in this section refer to Python unless stated otherwise.

1. TRUE/FALSE: Tuples are immutable.
2. TRUE/FALSE: Lists are immutable.
3. TRUE/FALSE: A list can be used as a dictionary key.
4. TRUE/FALSE: bob-1 is a valid variable name.
5. TRUE/FALSE: _ is a valid variable name.
6. TRUE/FALSE: break is a valid variable name.
7. TRUE/FALSE: Floating point numbers can precisely represent any real number.
8. TRUE/FALSE: The length of a string can be zero.
9. TRUE/FALSE: The order of dictionary keys is guaranteed.
10. TRUE/FALSE: In Unix, foo | bar sends the input of foo to the output of bar.
11. TRUE/FALSE: The > in Unix redirects the output of a program to a file.
12. TRUE/FALSE: An int is automatically converted into a long when necessary. Python 3 no longer has the long type.
13. TRUE/FALSE: [1,2,3][2] == (3,2,1)[1] + 1

Data Representation, Number Conversion, and Bases

14. The maximum positive value that can be represented in a 16-bit signed integer is

(A) 16
(B) 32767
(C) 32768
(D) 65535
(E) 65536
15. The number of values that can be represented in 32 bits is
   (A) 32
   (B) $2^{32}$
   (C) $2^{32} - 1$
   (D) $2^{-32}$
   (E) $2^{32-1}$

16. Binary is another name for base
   (A) 2
   (B) 4
   (C) 6
   (D) 8

17. To represent five distinct values, you need at least this many bits:
   (A) 1
   (B) 2
   (C) 3
   (D) 5
   (E) 8

18. Any ASCII character can be represented in how many bytes:
   (A) 1
   (B) 2
   (C) 3
   (D) 4

19. Any Unicode character can be represented in how many bytes:
   (A) 1
   (B) 2
   (C) 3
   (D) 4

20. In base two, what number comes after 010101 (i.e., is one greater than 010101)?
   (A) 010110
   (B) 110101
   (C) 010111
   (D) 101010

21. 1100 is a 4-bit signed integer in two’s-complement representation. What is it in base ten?
   (A) 12
   (B) 11
   (C) 4
   (D) -4
   (E) -12
22. 12 is a base nine number. What is it in octal?

(A) 11
(B) 12
(C) 13
(D) 14

23. 123 is a hexadecimal number. What is it in base 16?

(A) 123
(B) 7B
(C) 173
(D) 291

24. 71 is a base ten number. In base four it is

(A) 113
(B) 311
(C) 1013
(D) 3101

25. 71 is a base ten number. In base two it is

(A) 1000111
(B) 100111
(C) 111000
(D) 111001

26. -3, represented as a 5-bit sign/magnitude base two number, is

(A) 10001
(B) 1101
(C) 0001
(D) 1001

27. The smallest number of bits needed to represent the “Course Name” data on the answer sheet (assuming only one circle is marked per column) is

(A) 4
(B) 7
(C) 28
(D) 32
(E) 108
Unix, Part I

Assume that a directory contains the following files:

```
    bob.py
    readme.txt
    xy
    foo
    blarg
```

28. Which filenames would the wildcard *.txt select?
   (A) bob.py readme.txt xy foo blarg
   (B) bob.py readme.txt blarg
   (C) bob.py readme.txt foo blarg
   (D) readme.txt
   (E) None of them

29. Which filenames would the wildcard b* select?
   (A) bob.py readme.txt xy foo blarg
   (B) bob.py blarg
   (C) bob.py readme.txt foo blarg
   (D) readme.txt
   (E) None of them

30. Which filenames would the wildcard *??? select?
   (A) bob.py readme.txt xy foo blarg
   (B) bob.py readme.txt blarg
   (C) bob.py readme.txt foo blarg
   (D) readme.txt
   (E) None of them

31. Which filenames would the wildcard *.?? select?
   (A) bob.py readme.txt xy foo blarg
   (B) bob.py readme.txt
   (C) bob.py readme.txt blarg
   (D) readme.txt
   (E) None of them

32. Which filenames would the wildcard *y* select?
   (A) bob.py xy
   (B) bob.py
   (C) xy
   (D) All of them
   (E) None of them

33. Which filenames would the wildcard *A* select?
   (A) blarg readme.txt
   (B) blarg
   (C) readme.txt
   (D) All of them
   (E) None of them
Unix, Part 2

Use the following data for the questions in this section. All the fields are tab-separated. The data is located in a file called datafile.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>26</td>
<td>19</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>22</td>
</tr>
</tbody>
</table>

34. Which command will print the number of lines in the datafile?

(A) `wc -n datafile`
(B) `ls datafile`
(C) `cat datafile`
(D) `wc -l datafile`

35. Which of these commands will also print the number of lines in the datafile?

(A) `tail -1 datafile | wc -l`
(B) `cat -n datafile | tail -1 | cut -c1`
(C) `cat -n datafile | tail -1 | cut -f0`
(D) `cat -n datafile | tail -1 | cut -f1`

36. How many lines will the command `grep 6 datafile` print?

(A) 4
(B) 3
(C) 2
(D) 1
(E) 0

37. How many lines will the command `uniq datafile | sort -r` print?

(A) 4
(B) 3
(C) 2
(D) 1
(E) 0

38. What would this sequence of commands do:

```
    cp datafile x
    cat x > datafile
```

(A) Make the datafile empty, i.e., no contents
(B) Make datafile contain two copies of the original data, i.e., 8 lines
(C) Leave the datafile’s contents unchanged from the original
39. Which command prints out the second line only?

(A) head -3 datafile | tail -1
(B) tail -2 datafile | head -1
(C) head -3 datafile | tail -2 | head -1
(D) head -2 datafile

40. Which line does the command head -1 datafile | tail -1 datafile print?

(A) The first line
(B) The second line
(C) The third line
(D) The fourth line

Python, Part 1

Use the following data for the questions in this section. All the fields are tab-separated. The data is located in a file called datafile, and the file is piped into the Python programs below as it was on the second assignment, using cat datafile | python program.py.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>26</td>
<td>19</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>22</td>
</tr>
</tbody>
</table>

41. What does this code do?

```python
s = input()
s = input()
s = input()
s = input()
print(s)
```

(A) Prints the first line
(B) Prints the last line
(C) Nothing – Python reports a syntax error
(D) Nothing – Python reports an EOFError

42. Does this code do the same thing as the code in the last question?

```python
i = 0
while i < 5:
    s = input()
    i = i + 1
    print(s)
```

(A) Yes
(B) No
43. Which line of the datafile does this code print?

```python
k = 'abc'
for s in k:
    x = input()
    print(x)
```

(A) The first line  
(B) The second line  
(C) The third line  
(D) The fourth line

44. What does this code print?

```python
sum = 0
while 1:
    line = input()
    fields = line.split()
    if int(fields[1]) > 20:
        break
    sum = sum + int(fields[1])
print(sum)
```

(A) 12  
(B) 17  
(C) 28  
(D) 43  
(E) 55

Python, Part 2

45. What does this code print?

```python
s = 'abcde'
t = '
for ch in s:
    t = t + ch
print(t)
```

(A) a  
(B) abcde  
(C) edcba  
(D) Nothing – Python reports a syntax error  
(E) Nothing – Python reports a run-time error
46. How many lines of output does this code print, assuming sufficient input?

   i = 0
   while i < 5:
       input()
       i = i + 1
   # now output
   while i < 15:
       print(i)
       i = i + 1

   (A) 0  
   (B) 5  
   (C) 10 
   (D) 15 
   (E) 20 

47. What does print( 2 + 3 * 5 ) print?

   (A) 10  
   (B) 17  
   (C) 25  
   (D) 30  

48. What does print( 2 + (3 * 5) ) print?

   (A) 10  
   (B) 17  
   (C) 25  
   (D) 30  

49. What does print( (2 + 3) * 5 ) print?

   (A) 10  
   (B) 17  
   (C) 25  
   (D) 30  

50. What type is x, after the statement x = 12.5 + 17 is executed?

   (A) int 
   (B) float  
   (C) None of the above – Python reports a syntax error 
   (D) None of the above – Python reports a run-time error  

51. The // operator has the same precedence as the division and multiplication operators. Therefore, the statement print( x // y + z ) is equivalent to

   (A) print( (x // y) + z ) 
   (B) print( x // (y + z) ) 
   (C) It depends on the types of x, y, and z
52. What does this code print?

```python
s = 'abcde'
t = ''
for ch in s:
    t = ch + t
print(t)
```

(A) a  
(B) abcde  
(C) edcba  
(D) Nothing – Python reports a syntax error  
(E) Nothing – Python reports a run-time error

**Python, Part 3**

Use the definition of `L` below to answer the questions in this section.

```python
L = [1, 2, 3, 4]
```

53. What is `len(L)`?

(A) 0  
(B) 1  
(C) 3  
(D) 4  
(E) 5

54. What is `L[2]`?

(A) 1  
(B) 2  
(C) 3  
(D) 4  
(E) A run-time error

55. What is `L[-1]`?

(A) 1  
(B) 2  
(C) 3  
(D) 4  
(E) A run-time error

56. What is `L[2:3]`?

(A) [2]  
(B) [3]  
(C) [2, 3]  
(D) [3, 4]  
(E) A run-time error
57. What is $L[:2]$?
   (A) [2]
   (B) [3]
   (C) [1, 2]
   (D) [1, 2, 3]
   (E) A run-time error

58. After $L.append(3)$, what is $L$?
   (A) [1, 2, 3, 4]
   (B) [1, 2, 3, 4, 3]
   (C) [3]
   (D) [3, 1, 2, 3, 4]

Python, Part 4

Use the definition of $D$ below to answer the questions in this section.

\[
D = \{ 1: 2, 3: 4, 5: 3 \}
\]

59. What is $\text{len}(D)$?
   (A) 0
   (B) 1
   (C) 3
   (D) 4
   (E) 6

60. What is $D[3]$?
   (A) 1
   (B) 2
   (C) 3
   (D) 4
   (E) 5

61. What does this code print?

```
i = 1
j = 0
while j < 3:
    print(D[i])
    j = j + 1
    i = i + 4
    i = i % 6
```

   (A) 2, 4, 3
   (B) 1, 3, 5
   (C) 2, 3, 4
   (D) 5, 3, 1
   (E) 4, 3, 2
Answer Key

Q1: true; Q2: false; Q3: false; Q4: false; Q5: true; Q6: false; Q7: false; Q8: true; Q9: false; Q10: false; Q11: true; Q12: n/a; Q13: true; Q14: B; Q15: B; Q16: A; Q17: C; Q18: A; Q19: D; Q20: A; Q21: D; Q22: C; Q23: A; Q24: C; Q25: A; Q26: D; Q27: B; Q28: D; Q29: B; Q30: C; Q31: D; Q32: A; Q33: E; Q34: D; Q35: D; Q36: B; Q37: A; Q38: C; Q39: C; Q40: D; Q41: B; Q42: B; Q43: C; Q44: C; Q45: B; Q46: C; Q47: B; Q48: B; Q49: C; Q50: B; Q51: A; Q52: C; Q53: D; Q54: C; Q55: D; Q56: B; Q57: C; Q58: B; Q59: C; Q60: D; Q61: C.