CPSC 217 Midterm 1

Duration: 60 minutes

13 February 2020

- This exam has 58 questions and 16 pages.
- You may use one single-sided 8.5x11” piece of paper with whatever you want written on it. Apart from that, this exam is closed book. No notes, books, calculators or electronic devices, or other assistance may be used.
- Mark your answers on the supplied answer sheet.
- If you think there are multiple correct answers to a question, select the best answer.

Due to the number of people in the room, you must stay for the entire exam.
Part 1

1. Real numbers are the same as...
   (A) floating point numbers in Python
   (B) integers in Python
   (C) strings in Python
   (D) whitespace characters in Python
   (E) none of the choices listed here

2. Integers in Python are the same as floating point numbers.
   (A) True
   (B) False

3. Python is a(n)... 
   (A) dynamically-typed language
   (B) statically-typed language
   (C) untyped language

4. When entered at the Python interpreter prompt, what information does this provide?
   import math
   print(dir(math))
   (A) A list of the functions and variables in the math module.
   (B) Detailed help on the functions and variables in the math module.
   (C) None; there is an error because dir has not been imported from the math module.
   (D) None; there is an error because the result of dir cannot be printed.

5. What does this code print when it is run?
   foo = '123'
   foo = foo + 10
   print(foo)
   (A) 12310
   (B) 133
   (C) 123
   (D) 10123
   (E) There is an error when this code is run

6. What is the type of foo after this code is run?
   foo = 'xyzzy'
   bar = foo
   foo = 12345
   foo = foo + 10
   print(foo)
   (A) 12355
   (B) Integer
7. What is the type of `top` after this code is run?

```python
top = 'xyzzy'
if len(top) != 5 and 'zz' in top:
    top = 42
print(top)
```

(A) 42  
(B) Integer  
(C) Floating point  
(D) String  
(E) There is an error when this code is run

8. A sentinel is

(A) a unique value that signals the end of input items. 
(B) a unique value that signals the end of file (EOF). 
(C) the Boolean expression that is checked by an if statement. 
(D) a count of the number of data items that follow.

9. This code appeared in the lecture notes.

```python
i = 0
while i < 5:
    print i
    i = i + 1
```

(A) True  
(B) False

10. How many times is `X` printed when this code is run?

```python
for i in range(7):
    print('X')
```

(A) 0  
(B) 6  
(C) 7  
(D) 8  
(E) Some other number of times not listed here

11. How many times is `X` printed when this code is run?

```python
for i in range(3, 12):
    print('X')
```

(A) 12  
(B) 11
(C) 9
(D) 8
(E) Some other number of times not listed here

12. How many times is X printed when this code is run?

```python
for i in range(5, -2, -1):
    print('X')
```

(A) 0
(B) 1
(C) 7
(D) 8
(E) Some other number of times not listed here

13. How many times is X printed when this code is run?

```python
for i in range(0, 6, 2):
    print('X')
```

(A) 6
(B) 5
(C) 3
(D) 4
(E) Some other number of times not listed here

14. You have learned that a `for` loop iterates over a sequence, and you have also learned that a string is a sequence of characters. These ideas can be put together. For example, the following code

```python
s = '05732'
x = 0
for ch in s:
    x = x + int(ch)
print(x)
```

(A) 17
(B) 0
(C) 05732
(D) 005732
(E) 5732
15. What does this code print when run?

```python
b = True
i = 3
while b:
    if i > 5:
        break
    print(i)
    i = i + 2
    b = not b
```

(A) 3  
(B) Nothing  
(C) 3, then 5  
(D) 3, 5, then 7  
(E) 5, then 7

16. How many of the following statements evaluate to True?

- False or True
- False and True
- True and True
- False or False

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

17. How many of the following statements evaluate to False?

- False or not True
- (not False) and True
- False and True
- False or False

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

18. How many of the following statements evaluate to True?

- not (not (not True))
- (True or False) and not(True and False)
- not False
- (True or True) and not(True and True)

(A) 0  
(B) 1
19. For any string \( s \), `len(s * 0)` is equal to 0. What does this code draw when run?

```python
import turtle
for n in range(2):
    turtle.color('red' * (n % 2) + 'blue' * ((n + 1) % 2))
    turtle.begin_fill()
    for i in range(5):
        turtle.fd(50)
        turtle.lt(90)
    turtle.end_fill()
    turtle.rt(90)
```

(A) A blue square followed by a red square
(B) A red square followed by a blue square
(C) Two red squares
(D) Two blue squares
(E) Neither of the two shapes are squares

20. How many of the following programs, when run, print \( X \) exactly three times?

<table>
<thead>
<tr>
<th># Program 1</th>
<th># Program 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>for i in range(3):</td>
<td></td>
</tr>
<tr>
<td>print('X')</td>
<td></td>
</tr>
<tr>
<td>i = 3</td>
<td></td>
</tr>
<tr>
<td>while i &lt;= 6:</td>
<td></td>
</tr>
<tr>
<td>print('X')</td>
<td></td>
</tr>
<tr>
<td>i = i + 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th># Program 3</th>
<th># Program 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>s = 'X'</td>
<td></td>
</tr>
<tr>
<td>s = s + s + s</td>
<td></td>
</tr>
<tr>
<td>print(s)</td>
<td></td>
</tr>
<tr>
<td>for i in range(3):</td>
<td></td>
</tr>
<tr>
<td>print(X)</td>
<td></td>
</tr>
</tbody>
</table>

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

21. What does this code print when run?

```python
for i in range(2):
    for j in range(2):
        print('X')
        print('Y')
```

(A) The sequence \( X Y X Y X Y \)
(B) The sequence \( X Y X X X Y \)
(C) The sequence \( X Y Y X Y X X \)
(D) The sequence Y X X Y X X
(E) The sequence X X Y X Y X X Y

22. What does this code print when run?

```python
b1 = True
b2 = False
print('A')
if b1 == True:
    print('B')
print('C')
```

(A) A, then C
(B) The sequence A B C
(C) A, then B
(D) The sequence A C B

23. What does this code print when run?

```python
b1 = True
b2 = False
print('A')
if b1 == True:
    print('B')
elif b1 == False:
    print('C')
print('D')
```

(A) A, then D
(B) The sequence A B D
(C) A, then B
(D) The sequence A B C D
(E) The sequence A C D

24. What does this code print when run?

```python
b1 = True
b2 = False
print('A')
if b2 == True:
    print('B')
elif b1 == False:
    print('C')
print('D')
```

(A) A, then D
(B) The sequence A B D
(C) A, then B
(D) The sequence A B C D
(E) The sequence A C D

25. What does this code print when run?
b1 = True
b2 = False
print('A')
if b1 == True:
    print('B')
elif b2 == False:
    print('C')
print('D')

(A) A, then D
(B) The sequence A B D
(C) The sequence A B C
(D) The sequence A B C D
(E) The sequence A C D

26. What does this code print when run?

b1 = True
b2 = False
print('A')
if b1 == True:
    print('B')
b2 = True
elif b2 == False:
    print('C')
print('D')

(A) A, then D
(B) The sequence A B D
(C) The sequence A B C
(D) The sequence A B C D
(E) The sequence A C D

27. What does this code print when run?

b1 = True
b2 = False
print('A')
if b1 == True:
    print('B')
b2 = True
if b2 == False:
    print('C')
print('D')

(A) A, then D
(B) The sequence A B D
(C) The sequence A B C
(D) The sequence A B C D
(E) The sequence A C D

28. What does this code print when run?
b1 = True
b2 = False
print('A')
if b1 == True:
    print('B')
    if b2 == False:
        print('C')
    else:
        print('D')
print('E')

(A) A, then E
(B) The sequence A B D E
(C) The sequence A B C E
(D) The sequence A B C D E
(E) The sequence A D E

29. What is the type of foo after this code is run?

    a = 911
    b = 12.3
    c = 42
    foo = b + a // c

    (A) Floating point
    (B) Integer
    (C) String
    (D) There is an error when this code is run

30. What happens if the following program is run with the input 12.3?

    s = input()
    f = int(s)
    n = f * 2
    print(n)

    (A) There is an error when this code is run
    (B) 24.6 is printed
    (C) 24 is printed
    (D) 24.0 is printed
    (E) 12.312.3 is printed

31. What does this code print when it is run?

    for i in range(1000):
        print(i)
        break
    print('A')

    (A) The numbers 0 to 999
    (B) The numbers 0 to 1000
    (C) 0
32. What does this code print when it is run?

```python
i = 42
while i > 0:
    print(i)
    continue
    i = i - 1
```

(A) The numbers 42 to 1, in decreasing order
(B) The numbers 42 to 0, in decreasing order
(C) 42
(D) 42, an infinite number of times
(E) Something else not listed here

33. Code obfuscation is a “dual use” technology that tries to make code harder to understand and analyze. What does the following lightly-obfuscated code print when run?

```python
_=6
_2=5
_3=_-2
print(_2+3*_3)
```

(A) 23
(B) 11
(C) 20
(D) 29
(E) There is an error when this code is run

34. The following code should print `goodbye` when the input is either `exit` or `quit`. What should AAA be replaced with?

```python
s = input()
if AAA:
    print('goodbye')
```

(A) `s == 'exit' or s == 'quit'
(B) `s == 'exit' or 'quit'
(C) `s == 'exit' and s == 'quit'
(D) `s == 'exit' and 'quit'
(E) `s == 'exit' or s != 'quit'

35. How many of the following statements evaluate to `True`?

- `'bar' < 'foo'`
- `2 + 3 != 20 - 15`
- `'10' > '9'`
- `not (2 >= 3)`

(A) 0
36. When this code is run...

```python
x = False or print('blarg')
```

(A) blarg is printed because Python has short-circuiting Boolean operators
(B) Nothing is printed because Python has short-circuiting Boolean operators
(C) blarg is printed because Python does not have short-circuiting Boolean operators
(D) Nothing is printed because Python does not have short-circuiting Boolean operators

37. When this code is run...

```python
x = False and print('blarg')
```

(A) blarg is printed because Python has short-circuiting Boolean operators
(B) Nothing is printed because Python has short-circuiting Boolean operators
(C) blarg is printed because Python does not have short-circuiting Boolean operators
(D) Nothing is printed because Python does not have short-circuiting Boolean operators

38. When run, the following code...

```python
NTRIES = 3
MAX = 10
MIN = 1
tries = 0
while tries < NTRIES:
    tries = tries + 1
    in = int(input('Number? '))
    if MIN <= n and n <= MAX:
        break
```

(A) ... gives the user two tries to enter a number between 1 and 10
(B) ... gives the user three tries to enter a number between 1 and 10
(C) ... gives the user four tries to enter a number between 1 and 10
(D) ... gives the user multiple tries to enter a number between 0 and 9
(E) ... does nothing – there is an error when it is run

**Part 2**

This code is supposed to multiply the integers from 1 to 5, inclusive, and print the resulting value. Starting with the following code:

```python
AAA
BBB
while CCC:
    DDD
    EEE
print(acc)
```
39. What should AAA be replaced with?
   (A) import math
   (B) acc = 0
   (C) acc = 1
   (D) Nothing

40. What should BBB be replaced with?
   (A) i = 0
   (B) i = 1
   (C) i = 5
   (D) Nothing

41. What should CCC be replaced with?
   (A) i < 5
   (B) i <= 5
   (C) i > 5
   (D) i >= 5
   (E) i != 5

42. What should DDD be replaced with?
   (A) acc = acc + i
   (B) acc = acc * i
   (C) acc * i
   (D) acc + 1
   (E) i = acc * i

43. What should EEE be replaced with?
   (A) i = i + 1
   (B) i = i * 1
   (C) i + 1
   (D) i
   (E) Nothing

**Part 3**

A data file’s format begins with the number of data values, followed by that many integers. You have seen this format before in lectures and tutorials. The data file, called datafile, currently contains

```
4
-5
3.5
9
-1
```

The program in this section is run as

```
python3 program.py < datafile
```
It is supposed to print the total of all the data numbers’ absolute values (i.e., all data numbers are treated as positive numbers). For this particular data file, 18.5 should be printed (5 + 3.5 + 9 + 1). Starting with the following code:

AAA
BBB
n = int(s)
CCC
for DDD:
    EEE
    number = FFF
    GGG

44. What should AAA be replaced with?
   (A) import math
   (B) import turtle
   (C) from turtle import *
   (D) import math
       import turtle
   (E) Nothing

45. What should BBB be replaced with?
   (A) s = input()
   (B) input()
   (C) input(s)
   (D) s = input
   (E) Nothing

46. What should CCC be replaced with?
   (A) int sum = 0
   (B) sum = 0
   (C) sum = 1
   (D) int sum = 1
   (E) Nothing

47. What should DDD be replaced with?
   (A) i in range(n)
   (B) range(n)
   (C) i in range(n + 1)
   (D) range(n + 1)
   (E) i in range(n - 1)

48. What should EEE be replaced with?
   (A) s = input()
   (B) input()
   (C) input(s)
   (D) s = input
49. What should FFF be replaced with?
   (A) abs(float(s))
   (B) float(s)
   (C) abs(int(s))
   (D) abs(s)
   (E) int(s)

50. What should GGG be replaced with?
   (A) sum = sum + number
   (B) sum + number
   (C) number = sum + number
   (D) sum = sum * number
   (E) sum * number

51. What should HHH be replaced with?
   (A) print(sum)
   (B) print(number)
   (C) print(n)
   (D) print(s)
   (E) Nothing

52. What should the output of the program be if the contents of datafile are changed to

```
2
-5
3.5
-4
-6
```

   (A) 8.5
   (B) -1.5
   (C) 18.5
   (D) 20.5
   (E) 0.5

---

**Part 4**

A data file's format consists of a sequence of commands, one per line. These commands are read by a program in program.py, which interprets them as turtle movements. The left command tells the program to turn the turtle left 90°; the forward command tells the program to move the turtle forward by 100 units; the quit command tells the program to stop reading commands and quit. The data file, called datafile, currently contains commands to draw a square:
forward
left
forward
left
forward
left
forward
quit

The program in this section is run as

```
python3 program.py < datafile
```

Starting with the following code:

```
AAA
while BBB:
  CCC
    if DDD:
        break
    elif EEE:
        FFF
    elif s == 'left':
        turtle.lt(90)
```

53. What should AAA be replaced with?

(A) Nothing
(B) import turtle
(C) from turtle import *
(D) from turtle import fd, lt
(E) import math
    import turtle

54. What should BBB be replaced with?

(A) True
(B) False
(C) s = 'quit'
(D) s != 'quit'
(E) s == 'quit'

55. What should CCC be replaced with?

(A) s = input()
(B) input()
(C) input(s)
(D) s = input
(E) Nothing

56. What should DDD be replaced with?

(A) s == 'quit'
(B) s = 'quit'
(C) 'quit'
(D) 'quit' in s
(E) s != 'quit'

57. What should EEE be replaced with?
   (A) s == 'forward'
   (B) s = 'forward'
   (C) 'forward'
   (D) 'forward' in s
   (E) s != 'forward'

58. What should FFF be replaced with?
   (A) turtle.fd(100)
   (B) turtle.fd()
   (C) fd(100)
   (D) fd()
   (E) turtle.lt(90)

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

End of questions. Remember that you must stay for the entire exam.