CPSC 231 Midterm 1

Duration: 40 minutes

7 February 2014

- This exam has 30 questions and 10 pages.
- 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. The Python `math` module contains `math.pi`. It is the exact representation of π.

   (A) True

   (B) False

2. An algorithm can be implemented in only one way in a given programming language.

   (A) True

   (B) False

3. `print` can be used for verifying the internal state of a program.

   (A) True

   (B) False

4. You see

   ```
   print 'Hello, world!'
   ```

   in a file named `foo.py`. This means that it is Python 3 code.

   (A) True

   (B) False

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

   ```
   s = '*'
   for i in range(5):
       s = s + '*'
       if len(s) <= 3:
           print('X')
   ```

   (A) 0

   (B) 1

   (C) 2

   (D) 3

   (E) 4

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

   ```
   '2' + 3 == 5
   'A' != 'a'
   True and False
   True or False
   ```

   (A) 0

   (B) 1

   (C) 2

   (D) 3

   (E) 4

7. How many of the following statements evaluate to `False`?

```
not True
True and (not False)
2 ** 3 != 6
1 + 2 * 3 >= 8
```

(A) 0

(B) 1

(C) 2

(D) 3

(E) 4

8. How many of the following are valid variable names?

```
for
_pooh
EL1TE
MIN0
```

(A) 0

(B) 1

(C) 2

(D) 3

(E) 4

9. What type is `x` after this code is run?

```
x = 42
x = 12.3
x = False
x = 'abc'
```

(A) integer

(B) floating point

(C) Boolean

(D) string

(E) There is an error when this code is run

10. What is printed when this code is run?

```
sum = 4
for i in range(3, 7):
    sum = sum + i
print(sum)
```

(A) `22`

(B) `29`

(C) `18`

(D) `25`

(E) `11`

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

```
i = 0
while i < 4:
    i = i + 1
    if i == 2:
        continue
    print('X')
```

(A) 0

(B) 1

(C) 2

(D) 3

(E) 4

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

```
i = 0
while i < 4:
    i = i + 1
    if i == 2:
        break
    print('X')
```

(A) 0

(B) 1

(C) 2

(D) 3

(E) 4

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

```
a = True
b = False
if a or b:
    print('W')
elif a and b:
    print('X')
else:
    print('Y')
print('Z')
```

(A) `W`, then `Z`

(B) `W`, then `X`, then `Z`

(C) `X`, then `Z`

(D) `Y`, then `Z`

(E) `Z` only

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

```
a = True
b = False
if a or b:
    print('W')
```

```
if a and b:
    print('X')
else:
    print('Y')
print('Z')
```

(A) `W`, then `Z`

(B) `W`, then `Y`, then `Z`

(C) `X`, then `Z`

(D) `Y`, then `Z`

(E) `Z` only

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

```
for i in range(2):
    for j in range(2):
        print(i + j)
```

(A) `0`, `1`, `1`, and `2`, in that order

(B) `0`, `1`, `1`, and `1`, in that order

(C) `0`, `0`, `1`, and `1`, in that order

(D) `0`, `1`, `2`, and `3`, in that order

(E) `1`, `2`, `3`, and `4`, in that order

Part 2

When complete, the program below should multiply the numbers in a data file together and output the result. The data are in a file whose format begins with the number of data values, followed by that many values. You have seen this format before in lectures and tutorials. The program is run as

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

And, for example, if `datafile` contains

```
4
27
2
-1
0.5
```

then `-27.0` would be printed when the program is run as shown. Starting with the following:

```
AAA
n = int(input())
for i in range(BBB):
    CCC
print(DDD)
```

16. What should `AAA` be replaced with?

(A) `acc = 1`

(B) `acc = 0`

(C) `acc = input()`

(D) `acc = int(input())`

17. What should `BBB` be replaced with?

    (A) `n`

    (B) `n + 1`

    (C) `n - 1`

    (D) `4`

    (E) `3`

18. What should `CCC` be replaced with?

    (A)
    ```
    data = float(input())
    acc = acc * data
    ```

    (B)
    ```
    data = float(input())
    acc = acc + data
    ```

    (C)
    ```
    data = int(input())
    acc = acc * data
    ```

    (D)
    ```
    data = int(input())
    acc = acc + data
    ```

19. What should `DDD` be replaced with?

    (A) `acc`

    (B) `n`

    (C) `data`

    (D) `int(acc)`

    (E) `int(data)`

Part 3

A data file contains integer temperatures, one per line, ending with the sentinel `end`. You have seen this format before in lectures. When complete, the program below should count the days above and below zero and print the result; temperatures equal to zero are ignored. The program is run as

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

And, for example, if `datafile` contains

```
3
0
15
-20
end
```

then when the program is run as shown, it will print

```
1 below zero
2 above zero
```

Starting with the following:

```
below = 0
above = 0
while AAA:
    line = input()
    if BBB:
        break
    n = int(line)
    CCC
print(below, 'below zero')
print(above, 'above zero')
```

20. What should `AAA` be replaced with?

    (A) `True`

    (B) `False`

    (C) `input()`

    (D) `line != 'end'`

    (E) `line != end`

21. What should `BBB` be replaced with?

    (A) `line == 'end'`

    (B) `line == end`

    (C) `line = end`

    (D) `line = 'end'`

22. What should `CCC` be replaced with?

    (A)
    ```
    if n == 0:
        continue
    elif n < 0:
        below = below + 1
    else:
        above = above + 1
    ```

    (B)
    ```
    if n < 0:
        below = below + 1
    elif n > 0:
        above = above + 1
    ```

    (C)
    ```
    if n < 0:
        below = below + 1
    elif n >= 0:
        above = above + 1
    ```

    (D) Two of the `if` statements listed here will work

    (E) All three of the `if` statements listed here will work

Part 4

Both `code1` and `code2` below draw the same thing. Assume the `turtle` module has already been imported.

```
# code1
N = 42
S = 5
for i in range(S):
    turtle.fd(N)
    turtle.lt(360 / S)
```

```
# code2
turtle.goto(42, 0)
turtle.goto(54.98, 39.94)
turtle.goto(21.00, 64.63)
turtle.goto(-12.98, 39.94)
turtle.goto(0, 0)
```

23. What do they draw?

    (A) pentagon
    (B) square
    (C) hexagon
    (D) octagon
    (E) decagon

24. How many of the following properties does `code1` have?

    - The shape it draws can be easily changed.
    - The shape it draws can be easily resized.
    - The shape it draws can be easily drawn in a different location.
    - The shape it draws can be easily drawn in a different orientation.

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

25. How many of the following properties does `code2` have?

    - The shape it draws can be easily changed.
    - The shape it draws can be easily resized.
    - The shape it draws can be easily drawn in a different location.
    - The shape it draws can be easily drawn in a different orientation.

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

Part 5

A `for` loop actually iterates over a sequence. Since a string is a sequence of characters, a `for` loop can iterate over the characters in a string. For example, when the following code is run

```
for ch in 'abc':
    print(ch)
```

it will print

```
a
b
c
```

The code below should input a string and determine whether or not the string contains a positive integer (with no sign) or a negative integer (with a - sign). For example, `'42'`, `'-1'`, and `'0'` are all okay; `'0-'`, `'-'`, `'--1'`, `'abc'`, and `'0x'` are all errors. Starting with the following:

```
s = input()
AAA
for BBB:
    if CCC and ch == '-':
        DDD
    if ch in '0123456789':
        EEE
    else:
        error = True
        break
if error:
    print('error')
else:
    print(s, 'is okay')
```

26. What should AAA be replaced with?

    (A)
    ```
    firstchar = True
    error = True
    ```

    (B)
    ```
    firstchar = True
    error = False
    ```

    (C)
    ```
    firstchar = False
    error = False
    ```

    (D)
    ```
    firstchar = False
    error = True
    ```

27. What should BBB be replaced with?

    (A) `ch in s`

    (B) `s in input()`

    (C) `ch in input()`

    (D) `s in ch`

28. What should CCC be replaced with?

    (A) `firstchar == True`

    (B) `firstchar = True`

    (C) `firstchar == ch`

    (D) `firstchar = ch`

29. What should DDD be replaced with?

    (A)
    ```
    firstchar = False
    continue
    ```

    (B)
    ```
    firstchar = True
    continue
    ```

    (C)
    ```
    firstchar = False
    break
    ```

    (D)
    ```
    firstchar = True
    break
    ```

    (E) `firstchar = False`

30. What should EEE be replaced with?

(A)
```
firstchar = False
error = False
```

(B)
```
firstchar = False
error = True
```

(C)
```
firstchar = True
error = False
```

(D)
```
firstchar = True
error = True
```

Answer Key

Q1: B; Q2: B; Q3: A; Q4: B; Q5: C; Q6: C; Q7: C; Q8: D; Q9: D; Q10: A; Q11: D; Q12: B; Q13: A; Q14: B; Q15: A; Q16: A; Q17: A; Q18: A; Q19: A; Q20: A; Q21: A; Q22: D; Q23: A; Q24: E; Q25: A; Q26: A; Q27: A; Q28: A; Q29: A; Q30: A.

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