

CPSC 217 Final Examination

Duration: 120 minutes

26 April 2011

- This exam has 80 questions and 16 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.
- Assume numbers are base ten unless stated otherwise.
- Assume questions refer to Python unless stated otherwise.
- If you think multiple answers may be correct, choose the best answer.

Part 1

1. What does the following code do when run? (Recall that `\n` is the newline character.)

```
f = open('foo.py', 'w')
f.write('if __name__ == "__main__":\n')
f.write('    print "foo"\n')
f.close()
import foo
```

- (A) Prints foo
 - (B) Prints nothing
 - (C) An error occurs when it is run.
2. This code is supposed to print out the string `s` backwards.

```
s = 'abcde'
t = ''
for ch in s:
    t = XXX
print t
```

What goes in the spot marked XXX?

- (A) `ch + t`
 - (B) `t + ch`
 - (C) `ch`
 - (D) `s`
3. What does the following code print when run?

```
try:
    print 'A',
    int('xxx')
    print 'B',
except:
    print 'C',
```

- (A) A
 - (B) A B
 - (C) A C
 - (D) A B C
 - (E) Nothing – there is an error in the code
4. Modules should exhibit
- (A) low cohesion and high coupling
 - (B) high cohesion and high coupling
 - (C) high cohesion and low coupling
 - (D) low cohesion and low coupling

5. Module `foo` contains

```
print 'X'
```

How many Xs are printed by

```
import foo
import foo
import foo
```

- (A) 0
- (B) 1
- (C) 2
- (D) 3

6. Consider the following code.

```
NTRIES = 3
MAX = 10
MIN = 1
try = 0
while try < NTRIES:
    try = try + 1
    s = raw_input()
    n = int(s)
    if MIN <= n and n <= MAX:
        break
```

When run, this code

- (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

7. It is usually hard to see the distinction between compilation and interpretation in Python because

- (A) Python doesn't compile code
- (B) Python doesn't interpret code
- (C) Python doesn't compile or interpret code
- (D) Compilation happens very fast, immediately before interpretation
- (E) Interpretation happens very fast, immediately before compilation

8. The `while` statement in Python has an optional `else` part – this is code which is run if the `while` loop is *not* exited with `break`. Consider the following code.

```
L = (1, 3, 5, 7)
i = 0
key = 4
while i < len(L):
    if key == L[i]:
        print 'key found'
        break
    i = i + 1
else:
    print 'key not found'
```

What does this code print when run?

- (A) `key found`
 - (B) `key not found`
 - (C) `key found`, followed by `key not found`
 - (D) Nothing – there is an error
9. What is the minimum number of bits required to represent any key on a 101-key keyboard?
- (A) 7
 - (B) 8
 - (C) 101
 - (D) 102
 - (E) 128
10. How many things can you represent with 5 bytes?
- (A) 5
 - (B) 2^5
 - (C) 2^{5-1}
 - (D) 2^{40}
 - (E) 2^{40-1}
11. How many nybbles are in 2KiB?
- (A) 512
 - (B) 1024
 - (C) 2048
 - (D) 4096
 - (E) 8192
12. TRUE/FALSE: Software is classed as a literary work under Canadian copyright law.
13. TRUE/FALSE: Canadian copyright law allows fair use.
14. TRUE/FALSE: Copyright protects ideas.
15. TRUE/FALSE: Using other people's code in your program may affect how you distribute your program.

16. Consider the following code segment:

```
s1 = 'world hello'
s2 = AAA
print s2
```

If the code is supposed to print `hello world`, what should `AAA` be replaced with?

- (A) `s1[6:] + s1[5] + s1[:4]`
- (B) `s1[6:] + s1[5] + s1[:5]`
- (C) `s1[6:len(s1)-1] + s1[5] + s1[:5]`
- (D) `s1[7:] + s1[6] + s1[:5]`
- (E) `s1[7:] + s1[6] + s1[:6]`

17. Consider the following code segment:

```
import turtle
# turtle window width
width = turtle.window_width()
# maximum data value
max_x = 42.0
AAA
```

If the code is supposed to compute the value of `x`, scaled to the turtle window's width, what should `AAA` be replaced with? Assume `x` is already defined.

- (A) `scaled_x = x / max_x`
- (B) `scaled_x = x / width`
- (C) `scaled_x = max_x * x / width`
- (D) `scaled_x = width * x / max_x`
- (E) `scaled_x = width - x / max_x`

18. 37 is a base ten number. What is it equal to?

- (A) 25_{16}
- (B) 45_8
- (C) 52_{16}
- (D) 54_8
- (E) Both (A) and (B)

19. 61 is a base ten number. What is it in base 16?

- (A) 3C
- (B) 3D
- (C) 3E
- (D) C3
- (E) D3

20. 146 is a base eight number. What is it in base 10?
- (A) 92
 - (B) 102
 - (C) 222
 - (D) 816
21. How many Unicode characters can be represented in eight bytes?
- (A) Exactly two
 - (B) At most eight
 - (C) At least two
 - (D) Only one
 - (E) (B) or (C)
22. -11 is a base ten number. What is it represented as an 8-bit sign/magnitude number?
- (A) 0000 1011
 - (B) 1000 1011
 - (C) 1011 0000
 - (D) 1011 0001
23. BAD is a hexadecimal number. What is it in binary?
- (A) 1100 1010 1101
 - (B) 1011 1011 1101
 - (C) 1011 1010 0101
 - (D) 1011 1010 1101
 - (E) 1011 1110 0101
24. TRUE/FALSE: Good error messages should be printed to the standard output.
25. TRUE/FALSE: When opening a binary file for reading, the second argument to `open` should be `'rb'`.
26. TRUE/FALSE: Typos in a program always result in syntax errors.
27. TRUE/FALSE: Logic errors are the easiest to debug.
28. TRUE/FALSE: Making sure each line of code is executed would be a type of white-box testing.
29. TRUE/FALSE: Pseudocode is one way to express an algorithm.
30. An algorithm that chooses the lowest-cost option at each step would be an example of a
- (A) brute-force algorithm
 - (B) divide-and-conquer algorithm
 - (C) greedy algorithm
 - (D) least-cost algorithm
 - (E) randomized algorithm

31. In the code below, the changes to L and n should be visible outside the function f.

```
def f(L):
    AAA
    n = 42
    L.append(1234)

n = 'abc'
L = ['a', 'b', 'c']
f(L)
```

What should AAA be replaced with?

- (A) Nothing
 - (B) `global n`
 - (C) `global L`
 - (D) `global n`
`global L`
 - (E) None of these will work
32. TRUE/FALSE: `False and True`
33. TRUE/FALSE: `type(range(5)) == type([])`
34. TRUE/FALSE: `'a' == 'b' or -5 < 7`
35. TRUE/FALSE: `'3' in str(21 + 13 % 3)`
36. TRUE/FALSE: `(not False) and (not True) == (not (False or True))`
37. TRUE/FALSE: Running a Python program like this

```
python program.py < out.txt
```

sends the program's standard output to the file `out.txt`.

Part 2

Use the following code to answer the questions in this part.

```
P = XXX
for i in P:
    if i == '0':
        x = 5
    elif i == 'p':
        x = x + x
    elif i == 't':
        x = x * x
    elif i == 's':
        x = str(x)
    else:
        print x,
```

38. What will the code above print, if **XXX** is changed to

'0!'

- (A) 0
- (B) 5
- (C) Nothing
- (D) Nothing – there is an error

39. What will the code above print, if **XXX** is changed to

'0tsp\$'

- (A) 25
- (B) 50
- (C) 55
- (D) 2525
- (E) Nothing

40. What will the code above print, if **XXX** is changed to

'0pst'

- (A) 100
- (B) 1010
- (C) 101010101010101010
- (D) Nothing
- (E) Nothing – there is an error

41. What will the code above print, if **XXX** is changed to

'0ttt0x'

- (A) 5
- (B) 125
- (C) 1255
- (D) Nothing
- (E) Nothing – there is an error

Part 3

The following code is supposed to read and print the N^{th} line number from a file at a particular URL; the variables **N** and **url** are set to these values, respectively.

```
N = 4
url = 'http://example.com/file.txt'
```

```
AAA
```

```
f = BBB CCC
for i in DDD:
    line = EEE
FFF
print line
```

42. What should go in the spot labeled AAA?
- (A) `import http`
 - (B) `import url`
 - (C) `import urllib`
 - (D) `import urlopen`
 - (E) Nothing
43. What should go in the spot labeled BBB?
- (A) `http.`
 - (B) `url.`
 - (C) `urllib.`
 - (D) `urlopen.`
 - (E) Nothing
44. What should go in the spot labeled CCC?
- (A) `httpopen(url)`
 - (B) `open()`
 - (C) `open(url)`
 - (D) `urlopen()`
 - (E) `urlopen(url)`
45. What should go in the spot labeled DDD?
- (A) `4`
 - (B) `N`
 - (C) `range(4)`
 - (D) `range(N)`
 - (E) `range(len(N))`
46. What should go in the spot labeled EEE?
- (A) `read()`
 - (B) `read(f)`
 - (C) `f.read()`
 - (D) `readline(f)`
 - (E) `f.readline()`
47. What should go in the spot labeled FFF?
- (A) `close()`
 - (B) `close(f)`
 - (C) `f.close()`
 - (D) `urlclose(f)`
 - (E) `f.urlclose()`

Part 4

The following code is supposed to read data from a CSV file whose filename is given as a command-line argument, and print the arithmetic mean of the data in the second field on each line. If no command-line argument is given then the CSV file should be read from the standard input.

AAA

```
if BBB:
    f = CCC
else:
    f = open(DDD, EEE)

n = 0
sum = 0.0
for FFF:
    fields = GGG
    sum = HHH
    III
print JJJ
```

48. What should go in the spot labeled AAA?

- (A) `import sys`
- (B) `import math`
- (C) `import turtle`
- (D) (A) and (B)
- (E) (A), (B), and (C)

49. What should go in the spot labeled BBB?

- (A) `sys.argv == 1`
- (B) `sys.argv[1] == 1`
- (C) `len(sys.argv) = 1`
- (D) `len(sys.argv) == 1`
- (E) `len(sys.argv[1]) == 1`

50. What should go in the spot labeled CCC?

- (A) `stdin`
- (B) `stdout`
- (C) `sys.stdin`
- (D) `sys.stdout`

51. What should go in the spot labeled DDD?

- (A) `sys.argv`
- (B) `sys.argv[]`
- (C) `sys.argv[0]`
- (D) `sys.argv[1]`
- (E) `sys.argv[2]`

52. What should go in the spot labeled EEE?

- (A) 'a'
- (B) 'r'
- (C) 'w'
- (D) 'r+'
- (E) 'w+'

53. What should go in the spot labeled FFF?

- (A) line in f
- (B) f.readline()
- (C) line in sys.stdin
- (D) fields in line
- (E) fields in f

54. What should go in the spot labeled GGG?

- (A) line.split()
- (B) line.split(' ')
- (C) line.split('\t')
- (D) line.split('/t')
- (E) line.split(',')

55. What should go in the spot labeled HHH?

- (A) float(fields[1])
- (B) float(fields[2])
- (C) sum + float(fields[0])
- (D) sum + float(fields[1])
- (E) sum + float(fields[2])

56. What should go in the spot labeled III?

- (A) n + 1
- (B) n = n + 1
- (C) break
- (D) continue
- (E) Nothing

57. What should go in the spot labeled JJJ?

- (A) n
- (B) sum
- (C) fields
- (D) sum / n
- (E) n / sum

Part 5

Assume that a directory contains the following files:

```
README
foo.py
bar.py
python
1.gif
2.gif
11.gif
```

58. Which filenames would the wildcard `[^a-z]*` select?
- (A) 1.gif 2.gif 11.gif
 - (B) foo.py bar.py python
 - (C) README 1.gif 2.gif 11.gif
 - (D) README foo.py bar.py python
 - (E) None of them
59. Which filenames would the wildcard `*py` select?
- (A) foo.py bar.py
 - (B) foo.py bar.py python
 - (C) None of them
 - (D) All of them
60. Which filenames would the wildcard `*py*` select?
- (A) foo.py bar.py
 - (B) foo.py bar.py python
 - (C) None of them
 - (D) All of them
61. Which filenames would the wildcard `*.???` select?
- (A) 1.gif 2.gif
 - (B) foo.py bar.py
 - (C) 1.gif 2.gif 11.gif
 - (D) foo.py bar.py 1.gif 2.gif 11.gif
 - (E) None of them
62. Which filenames would the wildcard `[12]*` select?
- (A) 1.gif 2.gif
 - (B) 1.gif 2.gif 11.gif
 - (C) None of them
 - (D) All of them

Part 6

Use the following code to answer the questions in this part.

```
D = {(2, 3): 2, 3: 5, 2: 3}
L = [1, 2, 3]
T = (2, 3)
```

63. TRUE/FALSE: L is immutable.
64. TRUE/FALSE: `range(1, 4) == L`
65. TRUE/FALSE: `len(T[1:2]) == 2`
66. `len(D)` is
- (A) 3
 - (B) 6
 - (C) 7
67. `D[L[3]]` is
- (A) 2
 - (B) 3
 - (C) 5
 - (D) An error
68. `D[L[2]]` is
- (A) 2
 - (B) 3
 - (C) 5
 - (D) An error
69. What would the code below print?

```
for k in D:
    if k == (2, 3):
        continue
    print D[k],
```

- (A) 5 3
- (B) 3 5
- (C) 2 5 3
- (D) 5 3 2
- (E) (A) or (B)

Part 7

Use the following two programs to answer the questions in this part.

```
# a.py                                # b.py
s = raw_input()                       s = raw_input()
n = int(s)                             n = int(s)
print n + 5                            print n * 2
```

70. The programs are run using

```
python b.py | python a.py
```

and the user enters 3 on the keyboard. What is the output?

- (A) 11
- (B) 16
- (C) 65
- (D) 82
- (E) Nothing – there is an error

71. The programs are run using

```
python a.py | python b.py
```

and the user enters 3 on the keyboard. What is the output?

- (A) 11
- (B) 16
- (C) 65
- (D) 82
- (E) Nothing – there is an error

72. The programs are run using

```
python b.py | python b.py | python a.py
```

and the user enters 4 on the keyboard. What is the output?

- (A) 21
- (B) 28
- (C) 165
- (D) 4225
- (E) Nothing – there is an error

Part 8

Use the following code to answer the questions in this part.

```
def f(n):
    if n <= 2:
        return 12
    elif n % 2 == 1:
        return f(n - 1) + 2
    else:
        return f(n - 2) + 3
```

73. The base case is
- (A) $n \leq 2$
 - (B) $n \% 2 == 1$
 - (C) Neither (A) or (B)
74. $f(2)$ is
- (A) 2
 - (B) 12
 - (C) An error
75. $f(3)$ is
- (A) 3
 - (B) 12
 - (C) 14
 - (D) 15
 - (E) An error
76. $f(5)$ is
- (A) 5
 - (B) 12
 - (C) 15
 - (D) 17
 - (E) An error

Part 9

The following code is supposed to read a value for n from the standard input, and compute and print

$$\frac{e^{2\pi} - n}{12n}$$

```
AAA
BBB
CCC
DDD
print num / denom
```

77. What should go in the spot labeled AAA?
- (A) `import math`
 - (B) `from math import *`
 - (C) `from math import e, pi`
 - (D) Nothing

78. What should go in the spot labeled BBB?

- (A) `n = input()`
- (B) `n = raw_input()`
- (C) `n = int(raw_input())`
- (D) `raw_input(n)`
- (E) `int(raw_input(n))`

79. What should go in the spot labeled CCC?

- (A) `num = math.e ** (2 * math.pi) - n`
- (B) `num = math.e ** 2 * math.pi - n`
- (C) `num = math.e ** (2 * math.pi) - n`
- (D) `num = math.e ** 2 * math.pi - n`

80. What should go in the spot labeled DDD?

- (A) `denom = 12n`
- (B) `denom = 12 * n`
- (C) `denom = 12 ** n`