CPSC 217 Final Exam

Duration: 120 minutes

16 April 2012

- This exam has 60 questions and 14 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.
Part 1

1. How many bits are needed to represent any of the five letters ‘a’, ‘b’, ‘c’, ‘d’, or ‘e’?
   (A) 2
   (B) 3
   (C) 4
   (D) 5
   (E) Some other value not listed here

2. How many bits are in 140 bytes?
   (A) 17.5
   (B) 140
   (C) 560
   (D) 1120
   (E) 1400

3. What is the base 10 number 12, converted to base 2?
   (A) 100000000000
   (B) 00010010
   (C) 1010
   (D) 1100
   (E) 1101

4. How many values can you represent with five bits?
   (A) 5
   (B) 10
   (C) 16
   (D) 32
   (E) 64

5. In an 8-bit two’s complement integer representation, the range of integers that can be represented is
   (A) -256...+256
   (B) -127...+127
   (C) -128...+127
   (D) -8...+8
   (E) -255...+255

6. How many ASCII characters fit in one byte?
   (A) 0
   (B) 1
   (C) 2
   (D) 7
   (E) 8
7. The following code is placed in a file called foo.py.

```python
print('X')
if __name__ == '__main__':
    print('Y')
```

What is printed if the following Python commands are run?

```python
import foo
import foo
```

(A) Nothing; there is an error
(B) X once and Y once
(C) X twice and Y twice
(D) X once
(E) X twice

8. Ensuring that all lines of code are executed at least once is a form of what? (Choose the most specific answer.)

(A) Unit testing
(B) Testing
(C) White box testing
(D) Code coverage
(E) Black box testing

9. How many different inputs are needed to ensure that every line of this code is executed at least once?

```python
import sys
def foo():
    sys.exit()
    s = input()
try:
    n = int(s)
    if n < 3:
        print('A')
    else:
        print('B')
except:
    if len(s) == 4:
        foo()
    print('C')
```

(A) 5
(B) 4
(C) 3
(D) 2
(E) 1
10. How many numbers will this code print when run?

```python
def foo(n):
    print(n)
    if n > 42:
        return 0
    return foo(n * 4)

foo(5)
```

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

11. After the following code is run, what can be said about a and b?

```python
a = True and False
b = (not a) and True
```

(A) a is True and b is True  
(B) a is True and b is False  
(C) a is False and b is True  
(D) a is False and b is False  
(E) None of the above

12. After the following code is run, what can be said about a and b?

```python
a = True or False
b = (not a) or True
```

(A) a is True and b is True  
(B) a is True and b is False  
(C) a is False and b is True  
(D) a is False and b is False  
(E) None of the above

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

```python
for i in range(4):
    for j in range(5):
        print('X')
```

(A) 4  
(B) 5  
(C) 9  
(D) 20  
(E) Some other number not listed here
14. Which loop prints the same thing as the following code?

```python
for i in range(-1, 5, 3):
    print(i)
```

(A) i = -1
    while i < 5:
        print(i)
        i = i + 3

(B) i = -1
    while i <= 5:
        print(i)
        i = i + 3

(C) i = 5
    while i > -1:
        print(i)
        i = i - 3

(D) i = 5
    while i >= -1:
        print(i)
        i = i - 3

15. What is the value of \( x \) after this code is run?

```python
x = 123
def foo(x):
    x = x + 1
def bar():
    x = x + 2
def baz():
    global x
    x = x + 3
foo(x)
baz()
```

(A) 123
(B) 124
(C) 125
(D) 126
(E) 127

16. How many times is \( X \) printed when the following code is run?

```python
for i in range(8):
    if i == 2:
        continue
    for j in range(i):
        print('X')
    if i > 4:
        break
```

(A) 4
(B) 8
(C) 13
(D) 15
(E) Some other number not listed here
17. The following code is supposed to draw a five-pointed star. What should AAA be replaced with?

```python
import turtle
N = 100
for i in range(5):
    turtle.fd(N)
    turtle.rt(AAA)
```

(A) 360  
(B) 180  
(C) 144  
(D) 90   
(E) 36

Part 2

In this section, you will be writing a program to rotate the values in each row of a 2-D matrix, M. In other words, if M is initially defined this way:

```python
M = [
    [ 1, 2, 3 ],
    [ 4, 5, 6 ],
    [ 7, 8, 9 ]
]
```

then after rotation, M would be

```python
[
    [ 2, 3, 1 ],
    [ 5, 6, 4 ],
    [ 8, 9, 7 ]
]
```

Starting with the following:

```python
for i in AAA:
    # save the first value in the row
    first = BBB
    for j in CCC:
        # shift the other values down
        M[i][j] = M[i][j+1]
        # put the saved value in the end of the row
        DDD = first
```

18. What should AAA be replaced with?

(A) range(len(M) - 1)  
(B) range(len(M))  
(C) range(M)  
(D) len(M)  
(E) M
19. What should BBB be replaced with?
   (A) M[0]
   (B) M[1]
   (C) M[0][i]
   (D) M[i][0]

20. What should CCC be replaced with?
   (A) range(len(M[i]))
   (B) range(M[i])
   (C) range(M[i]) - 1
   (D) range(len(M[i])) - 1
   (E) range(len(M[i]) - 1)

21. What should DDD be replaced with?
   (A) M[i][0]
   (B) M[0][i]
   (C) M[i][-1]
   (D) M[-1][i]
   (E) M[-1][0]

**Part 3**

Use the following definitions for the questions in this section.
L = [1, 3, 5, 7, 9]
T = (0, 2, 4, 6, 8)
D = {1: 5, 2: 4, 3: 3, 4: 2, 5: 1}

22. What is len(D)?
   (A) 4
   (B) 5
   (C) 9
   (D) 10
   (E) Some other value not listed here

   (A) 16
   (B) 17
   (C) 19
   (D) 20
   (E) An error

24. What is D[T[L[0]]]?
   (A) 4
   (B) 5
   (C) 2
   (D) 1
   (E) An error
25. Which of the following statements is true?

(A) L and T are both immutable
(B) L and T are both mutable
(C) T and D are both mutable
(D) T and D are both immutable
(E) L and D are both mutable

26. What is T[-4]?

(A) 0
(B) 2
(C) 4
(D) 6
(E) An error

27. What is L[:3]?

(A) [1]
(B) [1, 3]
(C) [1, 3, 5]
(D) [1, 3, 5, 7]
(E) An error

28. What is L[2:5]?

(A) [7, 9]
(B) [3, 5, 7]
(C) [5, 7, 9]
(D) [3, 5, 7, 9]
(E) An error

29. What is T[5]?

(A) 8
(B) 6
(C) 4
(D) 2
(E) An error

30. What is L[2:-2][1]?

(A) 3
(B) 5
(C) 7
(D) 9
(E) An error

31. What is T[1] != D[1]?

(A) True
(B) False
Part 4

In this section, you will be writing a Monte Carlo simulation. This simulation will compute the probability of rolling double sixes on six-sided dice. In other words, if you roll a pair of six-sided dice, what’s the probability that they will both be 6?

AAA

N = BBB
ofinterest = CCC
for i in DDD:
    die1 = EEE
die2 = EEE
    if FFF:
        ofinterest = GGG
print('probability is', HHH)

32. This will produce an exact answer to the stated problem.
   (A) True
   (B) False

33. What should AAA be replaced with?
   (A) import sys
   (B) import turtle
   (C) import math
   (D) import random
   (E) import montecarlo

34. What should BBB be replaced with?
   (A) 1
   (B) 10
   (C) 100
   (D) 1000
   (E) 100000

35. What should CCC be replaced with?
   (A) N
   (B) N-1
   (C) -1
   (D) 0
   (E) 1

36. What should DDD be replaced with?
   (A) N
   (B) N-1
   (C) len(N)
   (D) range(N)-1
   (E) range(N)
37. What should the two spots marked EEE be replaced with?

(A) randint()
(B) random.randint()
(C) randint(1, 6)
(D) random.randint(1, 6)
(E) random.random(1, 6)

38. What should FFF be replaced with?

(A) die1 == 6 or die2 == 6
(B) die1 == 6 and die2 == 6
(C) die1 == 6
(D) die2 == 6
(E) die1 + die2 == 6

39. What should GGG be replaced with?

(A) 1
(B) True
(C) + 1
(D) ofinterest + 1
(E) ofinterest[1]

40. What should HHH be replaced with?

(A) ofinterest
(B) ofinterest // N
(C) ofinterest / N
(D) N // ofinterest
(E) N / ofinterest
Part 5

In this section, you will be writing a program to solve the following problem.

The password file on Unix systems consists of a number of lines, one line per user, with colon-separated fields. For example:

aycock:x:632:1061:John Aycock:/home/profs/aycock:/bin/tcsh

Here, the field containing aycock is the username, and 632 is the user ID, a number uniquely assigned to the user. The password file has no explicit sentinel at the end of the file, or line count at the beginning of the file.

Your program must:

- Read zero or more password files whose filenames are given on the command line, e.g.,

  python3 myprogram.py passwordfile1 passwordfile2

- Skip password files that cannot be opened, and print an appropriate warning message.

- Skip password file entries whose user ID is not a positive integer, and print an appropriate warning message.

- Output the username and user ID for each user to the standard output, in such a way that your program’s output can be piped to

  cut -f1

  to extract the user ID column, and

  cut -f2

  to extract the username column.

AAA
BBB

def process(filename):
    try:
        CCC
    except DDD:
        print(EEE
            "can't open", filename, ':', e.strerror
        FFF
    GGG
    for line in f:
        fields = line.split(HHH)
        username = III
        userid = JJJ
        if KKK:
            print(LLL
                MMM
                NNN
            OOO
        print(PPP)
    QQQ
    for filename in RRR:
        SSS
41. What should AAA be replaced with?
   (A) import turtle
   (B) import math
   (C) import file
   (D) Nothing

42. What should BBB be replaced with?
   (A) import random
   (B) import math
   (C) import sys
   (D) Nothing

43. What should CCC be replaced with?
   (A) f = open(filename, 'a')
   (B) f = open(filename, 'r')
   (C) f = open(filename, 'r+')
   (D) f = open(filename, 'w')
   (E) f.open(filename)

44. What should DDD be replaced with?
   (A) EOFError
   (B) EOFError as e
   (C) IOError
   (D) IOError as e
   (E) Nothing

45. What should EEE be replaced with?
   (A) sys.argv[0],
   (B) sys.argv[1],
   (C) sys.argv,
   (D) filename,
   (E) Nothing

46. What should FFF be replaced with?
   (A) , file=sys.stdout
   (B) , sys.stdout
   (C) , file=sys.stderr
   (D) , sys.stderr
   (E) Nothing

47. What should GGG be replaced with?
   (A) sys.exit()
   (B) return
   (C) continue
   (D) break
   (E) Nothing
48. What should HHH be replaced with?
   (A) ' 
   (B) '/t'
   (C) '\t'
   (D) ':'
   (E) Nothing

49. What should III be replaced with?
   (A) fields[0]
   (B) fields[1]
   (C) fields[2]
   (D) fields[3]
   (E) fields[4]

50. What should JJJ be replaced with?
   (A) fields[0]
   (B) fields[1]
   (C) fields[2]
   (D) fields[3]
   (E) fields[4]

51. What should KKK be replaced with?
   (A) isdigit(userid)
   (B) not isdigit(userid)
   (C) userid.isdigit()
   (D) not userid.isdigit()
   (E) '0123456789' not in userid

52. What should LLL be replaced with?
   (A) sys.argv[0],
   (B) sys.argv[1],
   (C) sys.argv,
   (D) filename,
   (E) Nothing

53. What should MMM be replaced with?
   (A) username
   (B) 'bad user ID'
   (C) 'skipping username'
   (D) 'bad user ID, skipping username'
   (E) 'bad user ID, skipping username', username

54. What should NNN be replaced with?
   (A), file=sys.stdout
   (B), sys.stdout
   (C), file=sys.stderr
   (D), sys.stderr
   (E) Nothing
55. What should OOO be replaced with?
(A) sys.exit()
(B) return
(C) continue
(D) break
(E) Nothing

56. What should PPP be replaced with?
(A) username, userid
(B) userid, username
(C) userid + '\t' + username
(D) username + '\t' + userid

57. What should QQQ be replaced with?
(A) f.close()
(B) close(f)
(C) file.close(f)
(D) return
(E) Nothing

58. What should RRR be replaced with?
(A) sys.argv
(B) sys.argv[0]
(C) sys.argv[1]
(D) sys.argv[0:]
(E) sys.argv[1:]

59. What should SSS be replaced with?
(A) process(filename)
(B) process()
(C) process(sys.argv[i])
(D) process(sys.argv[0])
(E) process(sys.argv[1])

60. If this program – call it myprogram.py – were to be run as

```
python3 myprogram.py password.dat > output
```

which of the following statements would be true?
(A) You would see nothing output to the screen.
(B) You would see anything printed to standard input on the screen.
(C) You would see anything printed to standard error on the screen.
(D) You would see anything printed to standard output on the screen.
(E) You would see anything printed to both standard output and standard error on the screen.

End of questions.