Written Midterm Exam

This exam is closed book - you are allowed only one page of notes (double-sided). If a question seems unclear - please write down any assumptions you feel are needed. If you think that there is a just-plain mistake/typo - check with an instructor.

Anywhere we ask you what will be printed out, if you think an error will be generated, you may write "error". You do not need to write out what the whole error message would be.

(Note: questions 20-29 are worth half the points on the exam; make sure you leave enough time for them.)

1. (75) Write a statement to print the second to last element from any list L (assuming it has at least two items). When L is defined as follows, it would print just the letter l.

```
L = ['h', 'e', 'l', 'l', 'o']
```

```
print L[-2]
```

2. (75) After the following Python code is executed, what will be the type of n[:3]?

```
n = "12345"
```

   a. Integer
   b. Float
   c. String
   d. List
   e. Tuple
   f. None of the above; there will be an error

3. (75) After the following Python code is executed, what will be the type of L[2:3]?

```
L = ['h', 'e', 'l', 'l', 'o']
```

   a. Integer
   b. Float
   c. String
   d. List
   e. Tuple
   f. None of the above; there will be an error

4. (75) What will the following code print out?

```
myvar = "hello"
print myvar[0]
```

h

5. (75) What will the following code print out?

```
myvar = "hello"
print "myvar"[0]
```

m

6. (75) After the following Python code is executed, what will be the type of the variable x?

```
x = int(12.0) / float(5)
```

a. Integer
b. Float
c. String
d. List
e. None of the above; there will be an error

7. (75) What will print out?

```
x = 3
print x == x + 1
```

a. 3
b. 4
c. True
d. False
e. None of the above; there will be an error

8. (75) After the following Python code is executed, what will be the type of the variable s?

```
s = "<published>2009-01-23T20:04:53Z</published>"
t = s.split()
```

   a. Integer
   b. Float
   c. String
   d. List
   e. None of the above; there will be an error

   *Note on this problem: we intended to ask about the variable **t**. Since the question says **s**, we gave full credit for either c or d. The .split() method always returns a list if used on a string! If not used on a string, it will cause an error.*

9. (75) After the following Python code is executed, what will be the type of the variable t?

```
s = "<published>2009-01-23T20:04:53Z</published>"
t = s.find("2009")
```

   a. Integer
   b. Float
   c. String
   d. List
   e. None of the above; there will be an error

10. (100) What will the following code print out?

```
s = "<published>2009-01-23T20:04:53Z</published>"
print s.split('-')[1]
```

01

11. (150) What will the following code print out?

```
s = "<published>2009-01-23T20:04:53Z</published>"
print len(s.split('T')[0].split('2'))
```

3

12. (150) Consider two files, each containing the complete lyrics for one song. The first song has three verses, with a single chorus repeated after each verse. The second song has six verses, all different from each other. Both files have exactly the same number of characters in them. Which file has more information in it, the one with the chorus or the one with no chorus?

The file without the chorus has more information in it. Looking for mention of: less redundancy, more non-repeated information.

13. (150) Consider two coins. One is a "fair" coin, which lands on heads half the time and tails half the time. The other is a "biased" coin which lands on heads three quarters of the time. Which provides more information, the outcome of the toss of the fair coin or the biased coin? Or do they each provide the same amount of information? Briefly justify your answer in 1-2 sentences.

The fair coin provides more information; higher information entropy because 50% chance rather than the 75%/25%.

14. (150) You are currently connected to the directory ~/Documents/Courses/106/F14/Exams. Write one or more unix commands that will display the contents of ~/Documents/Courses/106

```
cd ../..
ls
```

OR

```
ls ../..
```

OR

```
cd ~/Documents/Courses/106
ls
```

OR

```
ls ~/Documents/Courses/106/
```

(several other correct options as well)

For the next three questions, assume that the following code has already executed.

```
L = ["First", "Second", "Third"]
```

15. (100) What would the following Python code print out?

```
for x in L:
    y = L[0]
    print y
```

First
First
First

16. (100) What would the following Python code print out?

```
for x in L:
    y = L[0]
print y
```

First

17. (100) What would the following Python code print out?

```
for x in L:
    y = x in L
    print y
```

True

True

True

18. (150) What will the following code print out?

```
x = 10.5
if x < 10:
    print "one"
elif x < 20:
    if x > 15:
        print "two"
    else:
        print "three"
elif x > 0
    print "four"
```

three

19. (150) What will the following code print out?

```
x = 10.5
if x < 10:
    print "one"
elif x < 20:
    if x > 15:
        print "two"
    else:
        print "three"
if x > 0
    print "four"
```

three

four

20. (150) What would this code print out?

```
L = []
L.append('a')
L.append('b')
L.append('c')
L[1]=0
print L
```

['a',0,'c']

21. (150) What would this code print out?

```
d = {}
d[1] = 'a'
d[2] = 'b'
d['c'] = 3
d['c'] = d['c'] + 1
print d['c']
```

4

22. (150) What would this code print out?

```
d = {}
d[1] = 'a'
d[2] = 'b'
d['c'] = 3
print 'a' in d.values()
```

True

23. (150) Write one line of code that accomplishes what the last three lines of code below do.

```
t = (20, 30, 40)
x = t[0]
y = t[1]
z = t[2]
```

`x,y,z = t`

24. (150) What value prints?

```
def g(x, y):
    z = y + x
    return y
y = 10
z = g(5, y)
print z
```

a. 5
b. 10
c. 15
d. None
e. There will be an error

25. (150) What will the following code print out?

```
x = -1
y = -2
z = -3
def h(x, y = 2, z = 3):
    print x, y, z

h(1)
```

`1 2 3`

The next two questions assume the following code has been executed.

```
L = [{'a':1, 'b':2, 'd':11},
     {'a':4, 'b':5, 'e':11},
     {'a':7, 'b':8, 'f':11}
    ]
```

26. (225) Write code to print each of the values associated with the key 'b' in each of the dictionaries in L. In other words, it should print:

2
5
8

```
for d in L:
     print d[‘b’]
```

27. (300) Write code that generates a single dictionary with one key for each of the keys in any of the dictionaries in L, and value equal to the count of how many dictionaries the key appears in. That is, the dictionary it generates should be:

{'a': 3, 'b': 3, 'c':3,'d': 1, 'e': 1, 'f':1}

```
# without defining function

dx = {}
for d in L:
     for k in d.keys():
          if k in dx:
               dx[k] = dx[k] + 1
          else:
               dx[k] = 1
```

OR

```
# with defining function

def new_dict(lst):
     dx = {}
     for d in lst:
          for k in d.keys():
               if k in dx:
                    dx[k] = dx[k] + 1
               else:
                    dx[k] = 1
     return dx
new_var = new_dict(L)
```

28. (300) Write code that repeatedly asks the user to input numbers. Keep going until the sum of the numbers is 21 or more. Print out the total.

```
sum = 0
while sum < 21:
      x = int(raw_input("Please enter a number"))
      sum = sum + x
print sum
```

29. (300) Define a function called deduplicate. It takes a list as input and returns a list that has all duplicates removed, keeping only the first instance of each item. For example, if passed the input [1, 2, 3, 2, 4, 2, 3, 4, 5], it would return [1, 2, 3, 4, 5].

```
def deduplicate(lst):
     acc_lst = []
     for x in lst:
          if x not in acc_lst:
               acc_lst.append(x)
     return acc_lst
```