SI 10I 106 – Winter 2014 **Name: _Solution set______________**

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.

Grade distribution:

range = [42, 97]

median = mean = 72

1. (2 points) Write an expression to print the third character from any string s (assuming it has at least three characters). When s is defined as follows, it would print just the letter l.

   ```
   s = 'hello'
   ```

   print (s[2])

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

   ```
   n = "12345"
   ```

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

3. (2 points) After the following Python code is executed, what will be the type of the variable x?

   ```
   x = 3 / 5
   ```

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

4. (2 points) After the following Python code is executed, what will be the type of the variable x?

```
x = "The answer is " + 42
```

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

5. (3 points) What will the following code print out?

```
yes = "weird"
print("yes"[-1])
```

s

6. (3 points) After the following Python code is executed, what will be the type of the variable s?

```
s = "This is some text".split()
```

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

7. (3 points) Will the following code cause a run-time error? If not, what will print out?

```
w = "Hi"
x = w == "Hello there"
print(x)
```

No error. Prints out:
False

8. (3 points) Which of the following are tests that authenticate someone as a human or a *very* human-like computer, and thus are similar in spirit to the Turing Test? For each, answer, write yes or no and give a brief explanation.

    a. A CAPTCHA puzzle that asks a web site visitor to transcribe a blurred image of a word.

    Yes. People can do this task. Computers can't.

    b. A security question on a web site that asks you your mother's maiden name.

    No. This authenticates that you are a particular human, not that you are any human rather than a computer.

    (But we accepted the answer yes, if your argument was something about only a particular human knowing the answer.)

    c. A task of listing the state capitols of all 50 states in the U.S.

    No. People aren't good at remembering something like that. Computers are.

    (We also accepted yes if you said that computers were *too* good at this task, and that anyone who could get all 50 clearly wasn't human. Of course, a computer that knew all 50 could be programmed to not give all 50 and pretend that it couldn't remember some of them.)

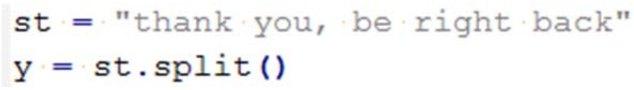
9. (3 points) Consider the following two partial English sentences. For which does the next word have higher entropy? Give a brief explanation.

    a. I ate a big breakfast this…

    b. I wonder if…

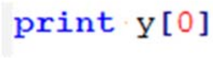
    The next word of b has higher entropy. For a, the next word will almost always be "morning". For b, there are many possibilities that are fairly common continuations.

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



```
st = "thank you, be right back"
y = st.split()
```

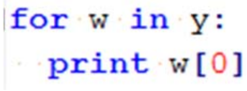
10. (3 points) What would the following Python code print out?



```
print y[0]
```

thank

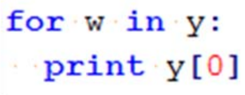
11. (3 points) What would the following Python code print out?



```
for w in y:
  print w[0]
```

t
y
b
r
b

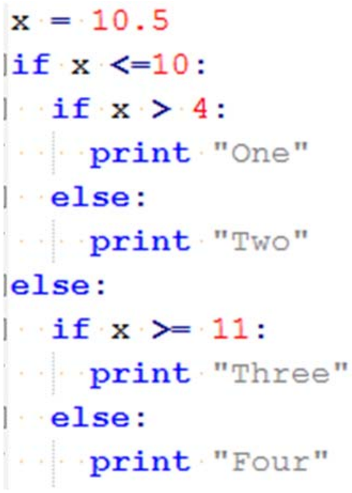
12. (3 points) What would the following Python code print out?



```
for w in y:
  print y[0]
```

thank
thank
thank
thank
thank

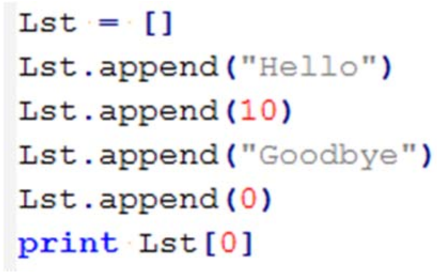
13. (3 points) What will the following code print out?



```
x = 10.5
if x <=10:
  if x > 4:
    print "One"
  else:
    print "Two"
else:
  if x >= 11:
    print "Three"
  else:
    print "Four"
```

a. One
b. Two
c. Three
d. Four
e. Nothing would print out
f. None of the above; there will be an error

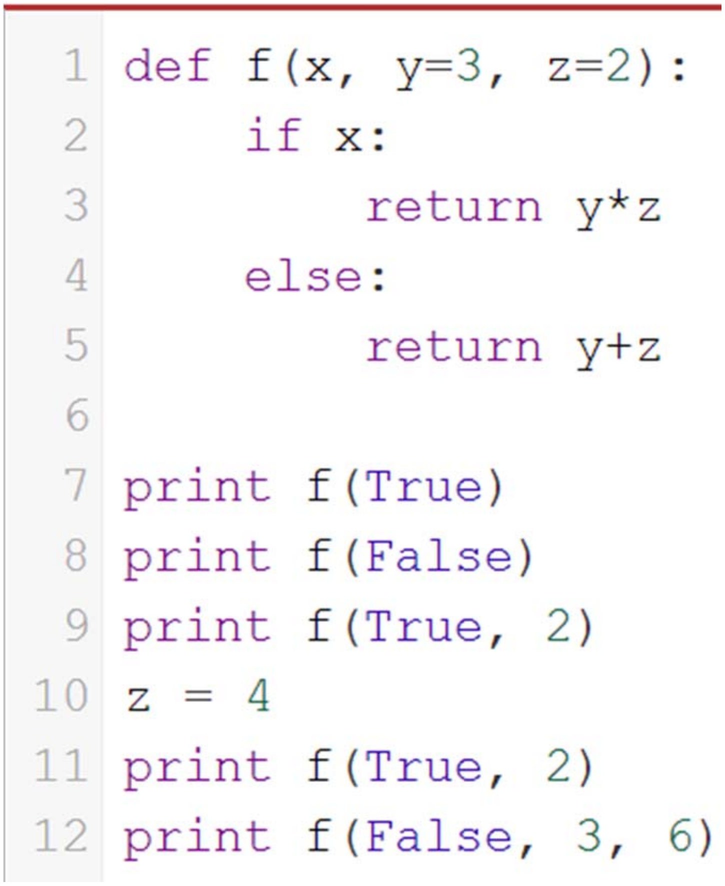
14. (3 points) What would this code print out?



```
Lst = []
Lst.append("Hello")
Lst.append(10)
Lst.append("Goodbye")
Lst.append(0)
print Lst[0]
```

Hello

15. (10 points) What would the following Python code print out?



```
def f(x, y=3, z=2):
    if x:
        return y*z
    else:
        return y+z

print f(True)
print f(False)
print f(True, 2)
z = 4
print f(True, 2)
print f(False, 3, 6)
```

6
5
4
4
9

16. (4 points) Write code to sort L in alphabetic order, so that "All 99" is first and "Delightful 80"

```
L = ["Clear 40", "All 99", "Beautiful 20", "Delightful 80"]
```

print sorted(L)

17. (4 points) Write code to sort L in reverse alphabetic order, so that "Delightful 80" is first and "All 99" is last

```
L = ["Clear 40", "All 99", "Beautiful 20", "Delightful 80"]
```

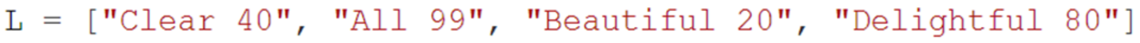
print sorted(L, None, None, True)

18. (5 points) Write code to sort L in order by how long the strings are, so that "All 9" is followed by "Clear 40", then "Beautiful 20".

```
L = ["Clear 40", "All 99", "Beautiful 20", "Delightful 80"]
```

print sorted(L, None, lambda x: len(x))

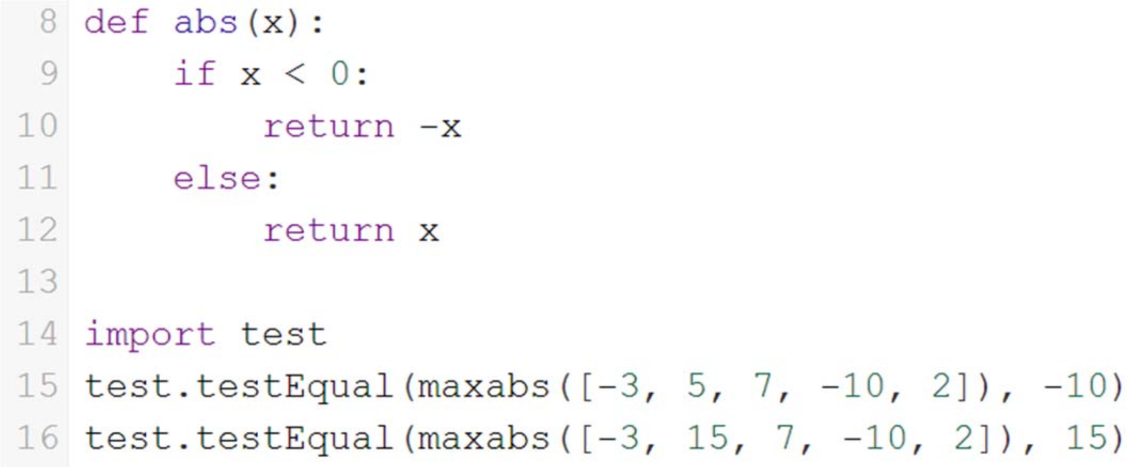
19. (5 points) Write code to sort L in order based on the two digit integer at the end of each string, so that “Beautiful 20” is first and “All 99” is last.



```
L = ["Clear 40", "All 99", "Beautiful 20", "Delightful 80"]
```

print sorted(L, None, lambda x: int(x[-2:]))

20. (10 points) Define a function that takes a list of integers (positive or negative) as input and returns the integer with the maximum absolute value. You may assume the list has at least one item in it and that they are all integers. See the test cases for examples of what your function should return for some particular inputs. (Note: the function abs is provided; it's the same as the built-in abs function; it returns the absolute value of any number.)



```
def abs(x):
    if x < 0:
        return -x
    else:
        return x

import test
test.testEqual(maxabs([-3, 5, 7, -10, 2]), -10)
test.testEqual(maxabs([-3, 15, 7, -10, 2]), 15)
```

```
def maxabs(L):
    m = L[0]
    for x in L:
        if abs(x) > abs(m):
            m = x
    return m
```

The next several questions all make use of the dictionary defined below (this follows the format of the heuristics dictionary in problem set 6).

```
d = {
  "H": {
    "guesses": ["o"],
    "priority": 2
  },
  "Ho": {
    "guesses": ["l"],
    "priority": 2
  },
  "Hol": {
    "guesses": ["m"],
    "priority": 2
  },
  "Holm": {
    "guesses": ["e"],
    "priority": 2
  },
  "Holme": {
    "guesses": ["s"],
    "priority": 2
  },
  "Holmes": {
    "guesses": [" ", ".", ","],
    "priority": 2
  },
  "q": {
    "guesses": ["u", "a"],
    "priority": 1
  },
  "ti": {
    "guesses": ["m"],
    "priority": 2
  },
  "tim": {
    "guesses": ["e"],
    "priority": 2
  }
}
```

21. (3 points) What will the following code print out?

```
print len(d.keys())
```

9

22. (3 points) What will the following code print out?

```
print len(d["Ho"].keys())
```

2

23. (3 points) What will the following code print out?

```
print d["Ho"]["guesses"]
```

['l']

24. (3 points) Write code so that the information associated with "H" will have priority 3 instead of 2.

D["H"]["priority"]=3

25. (10 points) Write code that produces a combined list of all the guesses from all of the dictionaries within d. It's OK if your combined list includes duplicate guesses (e.g., the letter 'e' can appear more than once).

```
res = []
for k in d:
    for let in d[k]["guesses"]:
        res.append(let)
```