

CS 1110 Prelim 1 March 15th, 2016

Circle your lab/situation:

ACCEL: Tue 12:20 Tue 1:25 Tue 2:30 Tue 3:35

ACCEL : Wed 10:10 Wed 11:15 Wed 12:20 Wed 1:25 Wed 2:30 Wed 3:35

PHILLIPS : Tue 12:20 Tue 1:25 Wed 12:20

I'm a grad student and hence LABLESS

This 90-minute exam has 7 questions worth a total of 41 points. When permitted to begin, scan the whole test before starting. Budget your time wisely.

When asked to write Python code on this exam, you may use any Python feature that you have learned about in class.

Unless otherwise stated, you may write helper functions when asked to write code, but include specifications for them in their doc strings.

It is a violation of the Academic Integrity Code to look at any exam other than your own, to look at any other reference material, or to otherwise give or receive unauthorized help. We also ask that you not discuss this exam with students who are scheduled to take a later makeup.

Academic Integrity is expected of all students of Cornell University at all times, whether in the presence or absence of members of the faculty. Understanding this, I declare I shall not give, use or receive unauthorized aid in this examination.

Signature: _____ Date _____

For reference:

<code>s[i:j]</code>	Returns: A new string <code>s[i] s[i+1] ... s[j-1]</code> under ordinary circumstances. Returns <code>''</code> if <code>i ≥ len(s)</code> or <code>i ≥ j</code> .
<code>s.find(s1)</code>	Returns: index of the first character of the first occurrence of <code>s1</code> in <code>s</code> , or <code>-1</code> if <code>s1</code> does not occur in <code>s</code> .
<code>s.rfind(s1)</code>	Returns: index of the first character of the last occurrence of <code>s1</code> in <code>s</code> , or <code>-1</code> if <code>s1</code> does not occur in <code>s</code> .
<code>s.index(s1)</code>	Like <code>find</code> , but raises an error if <code>s1</code> is not found.
<code>s.lower()</code>	Returns: a copy of <code>s</code> with all letters in it converted to lowercase.
<code>range(n)</code>	Returns: the list <code>[0, 1, 2, ..., n-1]</code>
<code>x in lt</code>	Returns: <code>True</code> if <code>x</code> is in list or string <code>lt</code> , <code>False</code> otherwise.

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Question	Points	Score
1	10	
2	5	
3	5	
4	8	
5	5	
6	7	
7	1	
Total:	41	

1. [10 points] Write the body of the function below so that it satisfies the given specification by making effective use of a loop. Omit its doc string.

Specification for `stopsby1(inst, targetfloor)`: Imagine an elevator that starts at floor 0 of a building that goes up to floor $+\infty$ and down to floor $-\infty$. `inst` is a non-empty string made up of 'U' and 'D' characters, where 'U' means the elevator goes up one floor, 'D' means it goes down one floor.

The function returns `True` if the elevator is ever at floor `targetfloor`, where `targetfloor` is an int. The function returns `False` otherwise.

Example input and output pairs:

```
'UUU', 0 --> True          'UDUDUD', 2 --> False
'UUU', 1 --> True          'UUUUDD', 2 --> True
'UUU', 3 --> True          'UDDUDDUDDU', -3 --> True
'UUU', 4 --> False
```

```
def stopsby1(inst, targetfloor):
```

2. (Booleans)

- (a) [3 points] Assign Boolean values to B1, B2, and B3 so that the values assigned to C1 and C2 are not the same.

Hint: you can just mechanically try all possible values for the B variables. Or, you could take this approach: look carefully at the expression for C1 and see if you can force it to have a certain value by setting the values of just one of the B variables; do the same for C2.

B1 = _____

B2 = _____

B3 = _____

C1 = (B1 or B2) and B3

C2 = B1 or (B2 and B3)

Given your choices for B1, B2, and B3, what values are assigned to C1 and C2?

C1 is _____

C2 is _____

(b) [2 points] Consider the following code.

```
x = input('Enter x')
y = input('Enter y')
if 1<=x<=3 and 1<=y<=3:
    print 'A'
elif x>3:
    print 'B'
elif y<1:
    print 'C'
```

Complete the following table with x -values and y -values so that the specified output is achieved. We've completed the first row for you.

x	y	Output
2	2	A
		B
		C

3. [5 points] While-loops.

Consider the following function:

```
def F(s):
    """
    PreC: s is a string that contains at least one 'N'
    """
    x = ''
    i = s.find(x+'N')

    while i>=0 :
        print i
        x = x + 'N'
        print x
        i = s.find(x+'N')
    print i
    return len(x)
```

What is printed out if we call `F('ENSNNNW')`? (No explanations necessary.)

4. [8 points] Function calls.

Consider the following python file.

```
def F(x,y):  
    z = x + y  
    return z  
  
if __name__ == '__main__':  
    x = 2  
    y = 3  
    z = 'x+y'  
    x = F(z, 'x')
```

Fill in the boxes below with the values that would result by executing the Python file above. To get you started, we've done the first box for you.

For the Application Script, before the call to F, we have:

x: y: z:

Then comes the call to F.

In F's call frame, x: y: z:

Back to the Application Script after the call to F, we have

x: y: z:

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5. [5 points] String processing.

Complete the implementation of the following function:

```
def F(s):  
    """ Returns an int that is the value of the integer specified by the characters  
    that are between the two slashes in s.
```

Example: if s is '234/05/65', F should return the int 5.

```
PreC: s is a string that is made up of characters from '0123456789/'.  
It contains exactly two slashes and they are not next to each other."""
```

6. [7 points] The following script displays 1000 random rectangles in the figure window:

```
from SimpleGraphics import *
from random import randint as randi
from random import uniform as randu

N = 1000
m = 10
MakeWindow(m+1)
# Comment 1
for k in range(N):
    x = randu(-m,m); y = randu(-m,m); L = randu(0,1); W = randu(0,1)
    i = randi(1,2)
    if i%2==0:
        fillcolor=CYAN
    else:
        fillcolor=MAGENTA
    DrawRect(x, y, L, W, FillColor=fillcolor)
# Comment 2
ShowWindow()
```

If run as is, approximately half of the displayed rectangles will be magenta.

On the next page, write a different version of the code between the two comments so that if the new version of the script is run,

1. about two-thirds of the displayed rectangles will be magenta, and
2. a new variable `AreaAve` is assigned the average area of *all and only* the magenta rectangles.

We have provided a template for your answer on the next page —just insert the required code in the blank areas. For your information, `randi(m,n)` returns a random integer with the property that `m<=randi(m,n)<=n` is `True`.

Write your answer in the template on the next page.

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Comment 1

```
for k in range(N):  
    x = randu(-m,m); y = randu(-m,m); L = randu(0,1); W = randu(0,1)
```

```
    if _____ :
```

```
        fillcolor=CYAN
```

```
    else:
```

```
        fillcolor=MAGENTA
```

```
    DrawRect(x,y,L,W,FillColor=fillcolor)
```

Comment 2

7. [1 point] Write your last name, first name, and Cornell NetID at the top of *each* page, and circle your lab time on the first page.

We suggest you carefully re-read all instructions and specifications before turning this exam in.