UC Berkeley
INFO 206A, Fall 2019
Exam 2

October 16, 2019

Print your name: _____

- If you need more space to answer a question than we give you, you may use the additional blank sheet of paper attached to your exam. Make sure that we know where to look for your answer.
- Read each question carefully and make sure that you answer everything asked of you. Write legibly so that we can read your solutions. Please do not write anything in red.
- We suggest that for solutions that require you to write Python code, you include comments. They will help your grader understand what you intend, which can help you get partial credit.
- You have until noon to complete the exams

Question	Value	Score
1	30	
2	10	
3	10	
4	10	
5	10	
6	15	
7	15	
Total	100	

Question 1 30 points

For each part of this question, consider the Python code shown. What is printed when this code is run (there are no errors in any of these parts)?

(a) (5 points)

```
def mystery( x, y, z="."):
    return x + y + z

s = mystery("a","b",",") + mystery("c","d")
print(s)
```

(b) (5 points)

```
L = []
L.append( 1 )
L.append( [2,3] )
L[1].append(4)
print(L)
```

(c) (5 points)

```
def mystery(x):
    while True:
        if x > 0:
            x = x -1
        else:
            return "abc"

print( mystery(2) )
```

(d) (5 points)

```
class Widget:
    def __init__( self, price ):
        self.price = price
    def __str__(self):
        return "the widget costs $" + str(self.price)

W = []
for p in range(0,10):
    W.append( Widget(p) )

print(W[0])
```

(e) (5 points)

```
def mystery(x):
    if len(x) == 0:
        return 0
    elif len(x) == 1:
        return 1
    else:
        return 1 + mystery(x[1:])

print( mystery("abcd") )
```

(f) (5 points)

```
def f():
    return( 2 )
def g():
    return( f() )
print( g() )
```

Question 2 10 points

Consider the Python code below. What is printed when this code is run (there are no errors in this code).

```
def mystery(A):
    j = len(A)-1
    B = list(A)
    for i in range(0,len(A)):
        B[i] = j
        j = j - 1

    C = list(A)
    for i in B:
        C[i] = A[B[i]]

    return C

print( mystery([7,8,9,10,11]) )
```

Question 3 10 points

Write a Python function `findMin` that takes as input a list of numbers and returns the minimum value in the list. You can assume that the list contains at least one element and that there are no duplicate numbers in the list (i.e., the minimum value is guaranteed to be unique). You cannot use any built-in Python functions such as `sort` or `min`. I recommend that you do this iteratively, not recursively. Your solution should not modify in any way the input list `L`

Question 4 10 points

Write a Python function `isSorted` that takes as input a list and returns `True` if the list is sorted in ascending order and `False` otherwise (e.g., the list [1,7,9,10] is sorted in ascending order). You can assume that the list contains at least one element and that there are no duplicate numbers in the list. You cannot use any built-in Python functions such as `sort`.

Question 5 10 points

Write a recursive function `replace` that takes as input three strings `S`, `x`, and `y` and replaces in `S` all occurrences of `x` with `y`. You can assume that the strings `x` and `y` will always be of length 1 (i.e., a single character). For example `replace("abcdbb","b","z")` will return `"azcdzz"`. Your solution cannot use any type of `for` or `while` loop.

Question 6 15 points

Write a class `Tree` with the following features:

1. (5 pts) The constructor should take as input 3 parameters as input: `x`, `y`, `height` and initialize instances variables with these same names. These parameters correspond to the location and height of a tree. The constructor should also initialize an additional instance variables `color`, to `"g"`, corresponding to the color of the tree.
2. (2 pts) Write a member function `grow` that when called increases the height of the tree by 1.
3. (3 pts) Write a member function `changeColor` that takes as input a parameter `color` and updates the corresponding instance variable to this color.
4. (5 pts) Write a member function `__str__` that when called prints "This tree is tall" if the tree's height is greater than 10 and otherwise prints "This tree is not tall".

Use this and the next blank page for your solution, clearly marking each part.

```
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```

Question 7 15 points

Write a class `Forest` with the following features:

1. (8 pts) The constructor should take as input a single parameter, an integer `N` and initialize the instance variable `forest` to be a list of `N` objects each of type `Tree` (from the previous problem). Each tree should be placed at a random x- and y-location ranging in value from 0 to 400 and with a random height between 1 and 5 (the location and height values should be integer-valued).
2. (7 pts) Write a short driver code that builds a Forest with 100 trees. Your driver should then grow each tree (using the appropriate Tree member function) a random number of times between 0 and 10.

NOTE: if you did not complete the previous problem, you can still complete this problem. Simply call the appropriate `Tree` functions assuming that they work properly.

```
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