

CS 115 Exam 3, Fall 2012

Your name: _____

Rules

- You may use one handwritten 8.5 x 11" cheat sheet (front and back). This is the only resource you may consult during this exam.
- Explain/show work if you want to receive partial credit for wrong answers.
- As long as your code is correct and obeys the specifications, you will get full credit. No points for style.
- When you write code, be sure that the indentation level of each statement is clear.

Grade (instructor use only)

	Your Score	Max Score
Problem 1		25
Problem 2		10
Problem 3		30
Problem 4		35
Total		100

Problem 1: 25 points.

What will print to the screen when each of the following snippets of code is executed in IDLE?

Be very clear with spacing, line breaks, etc.

Note: the parts of this problem are *independent*.

For all parts of this problem, assume that the following functions have been defined.

```
def f1( ):
    print("Hey")

def f2(x):
    return x ** 2

def f3(x, y):
    return f2(y) + x

def f4(y):
    import math
    return math.sqrt(y)
```

(a)
f1()

(b)
print(f2(f4(9)))

(c)
print(f3(3, 8))

(d)

```
x = 4  
print(f2(x), x)
```

(e)

```
y = 5  
print(f3(y, 1))
```

Problem 2: 10 points.

Consider the following sorted list:

```
L = ['AK',
     'AZ',
     'CA',
     'FL',
     'GA',
     'MD',
     'MN',
     'OH',
     'PA',
     'TX',
     'WY']
```

and the following binary search (which is essentially identical to your lab code):

```
# binary_search()
# Finds the position of an item in a list
# Parameters: the list; the item to search for
# Returns: the item's position (or None)
def binary_search(search_list, value_to_find):
    first = 0
    last = len(search_list) - 1

    while first <= last:
        middle = (first + last) // 2
        if value_to_find == search_list[middle]:
            return middle
        elif value_to_find < search_list[middle]:
            last = middle - 1
        else:
            first = middle + 1
    return None
```

You may want to label the elements of `L` with their numeric index values before proceeding.

Answer the questions on the next page.

(a) Fill out the following table tracing a binary search for *FL* in this list. You should fill out one row per iteration of the loop. If there are more rows than iterations, leave the extra rows blank.

Iteration	Value of first	Value of last	Value of middle	Value of L[middle]
1				
2				
3				
4				
5				

(b) Fill out the following table tracing a binary search for *RI* in this list.

Iteration	Value of first	Value of last	Value of middle	Value of L[middle]
1				
2				
3				
4				
5				

Problem 3: 30 points.

Define functions to perform the following tasks.

Keep in mind the following:

- Your functions should NOT ask the user for input.
- Your functions should NOT print anything.
- Your functions should NOT call `sys.exit()` to terminate the program.

(a) Define a function called `wordcount` that...

- * has one input parameter: a string
- * returns the number of words in the string

(b) Define a function called `list_letters` that...

- * has two input parameters: a list of strings, and a number N
- * returns the number of elements of the list that have at most N characters
- * does not change the list that was passed to it

- (c) Define a function called `all_even` that...
- * has one input parameter: a list of integers
 - * returns `True` if *all* elements of the list are even numbers and `False` otherwise

Problem 4: 35 points.

For this problem, you must write a **complete program**. That includes a docstring, a `def main()`, any necessary library imports, etc.

Read the instructions carefully before you start coding! If you get stuck, try to maximize your partial credit.

Your program should contain the following:

1. The definition of a function called `select_names` that does the following:
 - Takes two input parameters: a list of strings L and an integer N
 - Returns a new list $L2$ consisting of the elements of L that are exactly N characters. For example, if L is `['Ke$ha', 'Beyonce', 'Rihanna']` and N is 7, you would return a new list `['Beyonce', 'Rihanna']`
 - Does not modify the original list L
 - Does not have any `input` or `print` statements
2. The definition of a function called `build_list` that does the following:
 - Takes one input parameter: an integer N
 - Prompts the user for N names
 - Returns a list of the N names in the order the user typed them
3. The definition of a function called `get_number` that does the following:
 - Takes one input parameter: a string S
 - Prompts the user to enter a number. The prompt to the user should be the string S .
 - Prints an error message and exits the program immediately if the user does not enter a valid positive number.
 - Otherwise, returns the number the user entered.
4. A main function that does the following:
 - Calls `get_number` to ask the user how many names to read and exit if that number was not a valid positive number.
 - Calls `build_list` to get a list of that many names.
 - Calls `get_number` to ask the user for another integer P and exit if P is not a valid positive number.
 - Based on the user's list, prints all of the names with 1 character, then all of the names with 2 characters, and so on – up to P . Call `select_names` where appropriate.

[WRITE YOUR PROBLEM 4 CODE HERE]