CS 115 Exam 3, Spring 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, you will get full credit. No points for style.

• When you write code, be sure that you clearly indicate the indentation level of each statement.

Grade (instructor use only)

<table>
<thead>
<tr>
<th></th>
<th>Your Score</th>
<th>Max Score</th>
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<tbody>
<tr>
<td>Problem 1</td>
<td></td>
<td>25</td>
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<tr>
<td>Problem 2</td>
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<td>15</td>
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<td>Problem 3</td>
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<td>Problem 4</td>
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<td>30</td>
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<td><strong>Total</strong></td>
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</table>
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.

```python
def f1():
    return 12

def f2(x, y):
    return 2 * x + y

def f3(z):
    return f2(z, z+1)

def f4(x):
    x = 4
    return x ** 2
```

(a)
```python
print(f1())
```

(b)
```python
print(f2(3, 1))
```

(c)
```python
print(f3(1))
```
(d)
    a = 5
    print(f4(a))
    print(a)

(e)
    x = f1()
    print(x)
Problem 2: 15 points.
Consider the following sorted list:

cities = ['Cairo',
          'Lima',
          'London',
          'New York',
          'Paris',
          'Rome',
          'Seoul',
          'Sydney',
          'Tokyo']

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

```python
# 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 cities 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 Lima 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.

In the *Compare To:* column, you should give the VALUE (the name of the breakfast item) of the list element that will be compared to Lima.

<table>
<thead>
<tr>
<th>Old value of first</th>
<th>Old value of last</th>
<th>Compare to (e.g. <em>Tokyo</em>):</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
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</table>
Problem 3: 30 points.

Write 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) Write a function called `cube` that...
   * has one input parameter: a number
   * returns the cube of the number

(b) Write a function called `count_chickens` that...
   * has one input parameter: a list of words
   * returns the number of elements of the list that are equal to `chicken`
(c) Write a function called truncate that...
* has two input parameters: a list of words $L$, and a number $N$
• returns a new list. Each element of the new list consists of the first $N$
characters of the corresponding element of $L$. If the element of $L$ has fewer
than $N$ characters, then it is copied to the new list in its entirety.
Problem 4: 30 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!

Your program should contain the following:
1. A function called ReadIntFile that does the following:
   o Takes a filename as a parameter
   o Opens that file (you can assume the file exists)
   o Reads each line of the file in as an integer (you can assume that the file contains one integer per line)
   o Returns the list of integers read from the file

2. A function called IsSum that does the following:
   o Has two input parameters: a list $L$ and a number $N$
   o Returns True if $N$ is an element of $L$ and False otherwise

3. A main function that does the following:
   o Calls ReadIntFile to read from the file numbers.txt
   o Repeatedly prompts the user to enter a number:
     ▪ Prints Yes! if the user’s number was in numbers.txt
     ▪ Stops if the user enters a non-numeric values