1. Write a function that takes a value, k, and a list of values, and for every occurrence of k in the list, the function should replace that list item with k squared. Your function should also return the number of times k appeared in the list. Show what a call to your function would look like from main.

2. Given the following code fragment, show the value and type of the following expressions:

```python
def foo(ls, lo, hi):
    if(lo >= hi):
        return 1
    else:
        return 1 + foo(ls, lo+1, hi)

def main():
    print "in main"
    ls = [2,4,6,8]
    print ls
    print foo(ls, 0, 3)

main()
```

<table>
<thead>
<tr>
<th>Expression</th>
<th>Value</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) ls</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>(2) ls[2]</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>(3) foo(ls, 0, 3)</td>
<td>-----</td>
<td>----</td>
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</tbody>
</table>

3. What does the function foo do?

4. Using the program from question (2), trace through the execution of the program showing both (1) the output and (2) the stack contents. Draw the stack right before the first time a return from a call to foo is executed.
5. What is the minimum and maximum possible number of steps linear search will need to find a value in a list of 64 items? What are the min and max for a binary search with N=64?

6. Write a sort function (any sort) that takes in a list and sorts it. Show what a call to your sort function would look like from main.

7. Given the following list, show what the values for lo, hi, and mid would be at each step of a binary search for the value 7 in the list. How many total steps does binary searching for 7 in this list take? How many total steps would it take to do a linear search for 7 in this list?

   list -----------> [ -3,  4,  5,  10,  14,  18,  22,  31,  44,  66,  70]

   step 1:  lo: mid: hi:

   ...

8. Write an iterative function, SumEvens(n), that returns the sum of the even values between 1-n inclusive.

9. Write a recursive function, recSumEvens(n), that returns the sum of the even values between 1-n inclusive.

10. Write a main function that makes a call to the Sum and recSum functions and prints out the result.