COMP 4030/6030: Assignment 02/14/2016
Due date: 02/14/2016

   Email programming solutions to the TA (Quang Tran, qmtran@memphis.edu). Put "COMP 4030/6030 assignment 1" on the subject line.

1. (Programming assignment) Write an **iterative** Python function that takes two sorted lists and returns a sorted list that is a merge of the two lists. The function looks like this:

```
def merge(A, B):
    C = []
    # do some processing and manipulation
    return C
```

   Example, merge([1,3,5,7,9], [0,2,4]) returns [0,1,2,3,4,5,7,9].

2. (Programming assignment) Write a **recursive** Python function that takes two sorted lists and returns a sorted list that is a merge of the two lists.

3. Explain why (i) $10n + 2n^2 \in O(n^2)$ and (ii) $10n + 2n^2 \in \Omega(n^2)$

4. What is the running time complexity of the following function:

```
# L is a list of numbers
def foo(L):
    sum = 0
    for x in L:
        j = 1
        while j < len(L):
            sum += x*x*j
            j = j * 2
    return sum
```

5. Explain why the following function correctly adds all items in the input list L.

```
def add(L):
    if len(L) == 0:
        return 0
    return L[0] + add(L[1:])
```

6. Explain why the following function correctly select all even items in the input list L.

```
def select(L):
    if len(L) == 0:
        return []
    if L[0] % 2 == 0:
        return [L[0]] + select(L[1:])
    return select(L[1:])
```