COMP 7712: Assignment 4
Due date: 10/04/2016

1. Use the Master's theorem to determine the complexity (in terms of Θ) of the following functions

   (a) $T(n) = n^4 + 15 \cdot T(\frac{n}{2})$
   (b) $T(n) = 8n^2 + 9 \cdot T(\frac{n}{3})$
   (c) $T(n) = 10n^3 + 10 \cdot T(\frac{n}{2})$
   (d) $T(n) = 5n^3 + 10 \cdot T(\frac{n}{3})$

2. Given the following function, what is the input size (i.e. how do you describe the input size)?

```
1: FOO(A,L,R)
2:     if L ≥ R then return 1
3:     s ← 0
4:     for i = L to R do
5:         for j = i to R do
6:             s = L + R
7:     m = (L+R)/2
8:     return s + FOO(A,L,m-1) + FOO(A,m+1,R)
```

3. Write down the running time equation, $T(n)$, for the algorithm above, and use the master's theorem to find its running time complexity.

4. Write down the running time equation, $T(n)$, for the following Python program and use the master's theorem to find its running time complexity AND space complexity.

```
def Total(A):
    if len(A) < 1:
        return 0
    A = A[0 : len(A)//2]
    B = A[len(A)//2 : len(A)]
    sum = 0
    for a in A:
        for b in B:
            sum = sum + a * b
    return sum + Total(A)
```