

CS375 Small Assignment 4

Due Sep 29th 10PM ET

Consider the following pseudo code for the generation of a list of all subsets of a given array (which is just a reproduction of what we wrote in class):

```
AllSubsets(A[0, ..., n-1]):
  Initialize L as [∅] (a list just containing the empty set)
  for i in range(n):
    Initialize nextL as an empty list
    for each set S in L:
      Create a copy S' of S
      Add A[i] to S'
      Add both S and S' to nextL
  L = nextL
  return nextL
```

1. What is the worst case runtime of the above function? (I am looking for a Θ bound here, so this is really two questions in one)
2. What is the best case runtime of the above function? (I am looking for a Θ bound here, so this is really two questions in one)
3. Using the loop invariant method we've discussed in class, show that the above algorithm correctly outputs a list containing all the subsets of A.

It may help to know that that

$$\sum_{i=0}^n 2^i = 2^{n+1} - 1$$

for this homework.