Sample Solution to Assignment #1

5.1 Balls are drown from a box as specified in Theorem 5.1. What are the corresponding values of i, j, k ?

a Red, 5, 6
i = j = 5, k = 6

b Blue, 5, 6
i = 5, j = k = 6

c Blue, 3, Red
i = j = k = 3

d 6, 5, Red
i = j = 5, k = 6

5.2 Why isn't an implementation based solely on Theorem 5.2 sufficient to obtain a subquadratic running time for the maximum contiguous subsequence sum problem ?
This is because the observation by Theorem 5.2 is not enough to tell the next subsequence we should consider. While Theorem 5.3 tell us that when a negative susequence is detected. not only can we break the inner loop, but also we can advance i to j+1.

5.11 An algorithm takes 0.5 milliseconds for input size 100. How long does it take for input size 500 if the running time is

a linear
2.5 millisecond

b $O(NlogN)$
3.3737 milliseconds

c quadratic
12.5 milliseconds

d cubic
62.5 milliseconds

5.15 For each of the following six program fragments
a. Give a Big-Oh analysis of the running time.

#1 $O(N)$
#2 $O(N^2)$
#3 $O(N)$
#4 $O(N^3)$
#5 $O(N^2)$
#6 $O(N^5)$