CS140 Homework 8[10 pts]

Due 11.10am Thursday February 28, 2019

Problem 1 [6]

Determine the big-O expression for each of the following T(N) functions:

(a) $T(N) = 2N + N (N + 3)$
(b) $T(N) = 5$
(c) $T(N) = N + \log N^2$
(d) $T(N) = N (2 + \log N)$
(e) $T(N) = \log (2N)$
(f) $T(N) = 2N + N^2 + 2^N$

Problem 2 [2]

Given an array list, determine following big-O costs:

(a) Worst case cost associated with finding the i^{th} element.
(b) Average cost for checking if a specific data value is present. All locations are equally likely.

Problem 3 [2]

Given a linked list, determine following big-O costs:

(a) Worst case cost associated with finding the i^{th} element.
(b) Average cost for checking if a specific data value is present. All locations are equally likely.

Problem 4 [Difficult -- Bragging rights only]

The big-O cost for executing the for-loop shown below is $O(\sqrt{N}) = O(N^{1/2})$. Give simple mathematical explanations why this is quadratically faster than $O(N)$, but exponentially slower than $O(\log N)$.

```
bool isprime(int N) {
  if (N<=1) return false;
  for (int i=2; i*i <= N; i++)
     if (number % i == 0) return false;
  return true;
};
```