**Christina Sadak**

**CSCI 271**

**Program 4**

**Due: 11/7/2017**

**Estimate…**the time it will take to do an insertion sort on data of size n=1,000,000 and n=10,000,000.

**Actual:**

|  |  |
| --- | --- |
| **n** | **T(seconds)** |
| 2000 | 0.048 |
| 4000 | 0.092 |
| 10000 | 0.652 |
| 20000 | 2.432 |
| 50000 | 16.02 |
| 100000 | 66.08 |

**Prediction:**

* Insertion sort is O()
* The times for small n are not very accurate, so to predict the times for data of size 1,000,000 and 10,000,000, I will use a more reliable base case of n=50,000.

|  |  |  |
| --- | --- | --- |
| **n** | **Math** | **T(seconds)** |
| 50,000 | F(n) = 1 | 1(16.02) = 16.02 |
| 100,000 | F(2n) = = 4 | 4(16.02) = 64.08 |
| 1,000,000 | F(20n) = = 400 | 400(16.02) = 6408 |
| 10,000,000 | F(200n) = = 4 | 40,000(16.02) = 640,800 |

Based on the base case of n=50,000, the predicted time it takes to do an insertion sort on n=100,000 is 64.08 seconds. This is slightly less than my actual time for n=100,000 of 66.08 seconds. This is okay because the timer’s resolution is not very exact. However, it is very close. Therefore, I predict that it would take 6,408 seconds (1.78 hours) to do an insertion sort on data of size n=1,000,000 and 640,800 seconds (178 hours) to do an insertion sort on data of size n=10,000,000.