Compeng 2SI4 Lab 1

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Question 1

- ArrayList: More than 10 → time complexity **Θ(n)**
  - Tested with various lengths, some computation time around TEST_LENGTH = 1000
- DLinkedList: More than 10 → time complexity **Θ(1)**
- SLinkedList: More than 10 → time complexity **Θ(1)**

Question 2

x_1	y_1
10	0
20	0
40	0
80	0
160	0
320	0
640	0.0050
1280	0.0050
2560	0.0125
5120	0.0331
10240	0.0734
20480	0.130
40960	0.330
81920	0.531
163840	1.17
327680	1.82

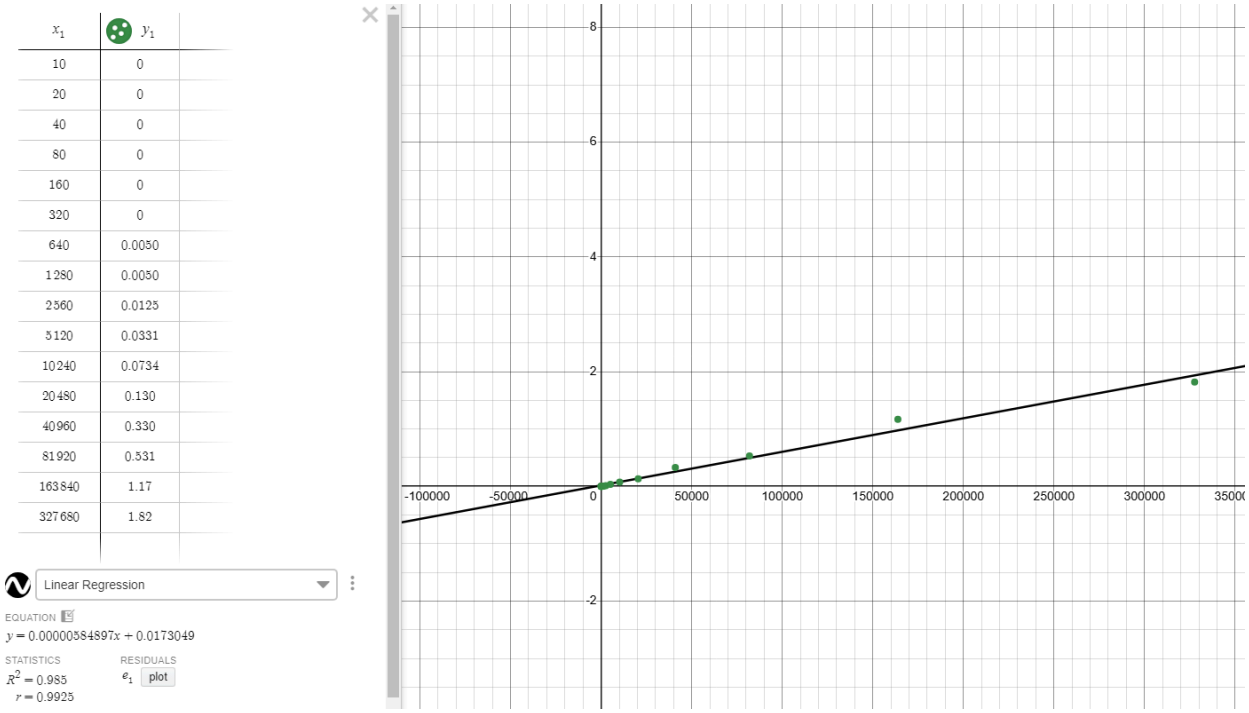

Figure 1: objPosArrayList insertHead tested with multiple TEST_LENGTH values

- As demonstrated in Figure 1, the insertHead function in objPosArrayList class exhibits linear behaviors of **Θ(n)** and an R^2 value of 0.985
- The objPosSLinkedList and objPosDLinkedList were both tested with TEST_LENGTH's of both 10 and 327680, in both cases there was no computation time, meaning it was constant scaling of **Θ(1)**

Question 3

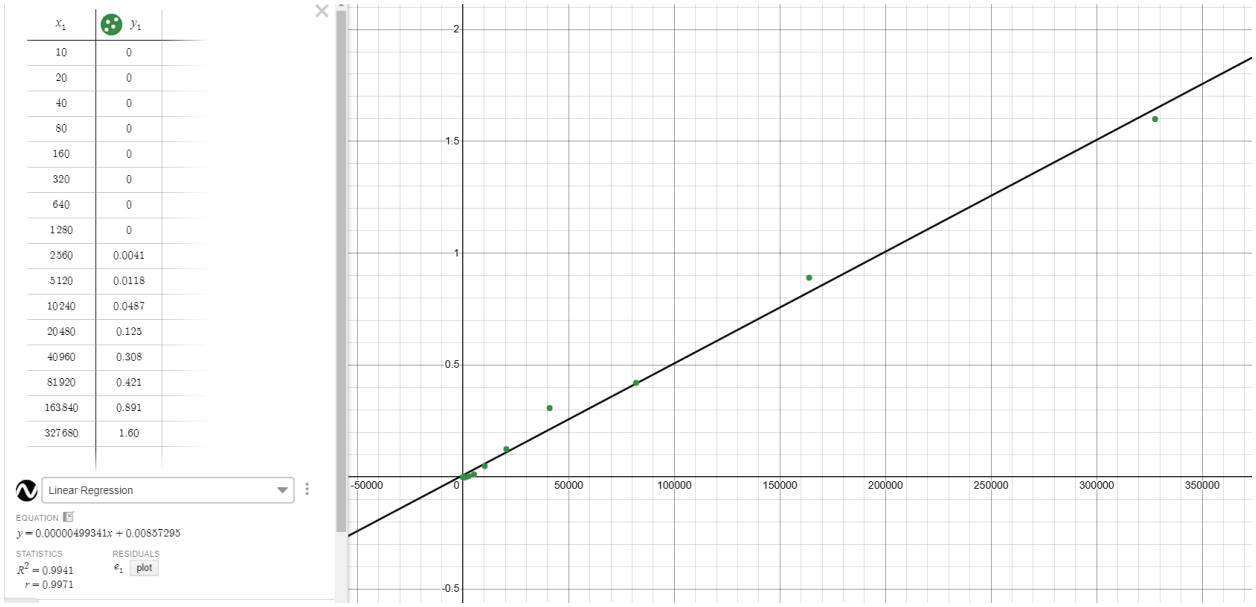

Figure 1: objPosSLinkedList insertTail tested with multiple TEST_LENGTH values

- As demonstrated in Figure 1, the insertTail function in objPosSLinkedList class exhibits linear behaviors of **Θ(n)** and an R^2 value of 0.9941
- The objPosDLinkedList and objPostArrayList were both tested with TEST_LENGTH's of both 10 and 327680, in both cases there was no computation time, meaning it was constant scaling of **Θ(1)**

Question 4

- The insertHead function inside of objPosArrayList is outperformed by the other two when the length is 640. This is larger than the snake will ever be since our board size is 30x15=450. Thus, in practice, there is no benefit to the alternative implementations for this function in this environment.
- Similarly, the insert tail function inside of objPosSLinkedList is only outperformed when the snake is larger than 2560. Thus, in practice, there is no benefit to the alternative implementations for this function in this environment.