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Question 3 Whitepaper

Question 3: Test a stack's speed (with millions of operations) as to which is faster: an array based stack or a linked list based stack.

For question 3, I decided to solve the question using a similar method I implemented in question 7 of HW1, which asked to test the speed of different linked list types. Because the framework of that question was quite similar to Q3, I decided to use the same methods to solve it.

First, I made a header file that encompassed the array stack and linkedlist stack classes. I derived the classes from question 1 and 2 of the homework which made it easier for me to implement them in the function.

After creating these header files, I instantiated a linked list stack and inserted random numbers into it (upto a maximum size of 1,000,000, since the question asked for "millions of operations), all the while timing the whole process.

I then instantiated an array stack and did the same process as the linked list stack. I inserted 1,000,000 random values into the stack and checked the speed of the stack.

In conclusion, all of my test runs showed that the array stack filled up considerably faster than the linked list stack. I wasn't surprised by the results because we weren't deleting anything in the array stack, rather just filling it up with values which it obviously does faster in an array-style function.

Below: One of the outputs I got from the program.

```
The LL stack fill-up took: 144291 microseconds

The array stack fill-up took: 31245 microseconds
```