Methodology

Section 1: getInput()

This section handles retrieving and parsing data from the user. Input is taken using a Scanner object and stored into 2 strings.

Section 2: getProduct()

This section finds all intermediate products of the multiplication with nested loops that traverse the number strings, starting at the back, and multiplying each character and adding a carry. The carry is adjusted when the result is greater than 10 and the result is also adjusted. After this the result is added to the front of the current intermediate string. At the end of the inner loop any remaining carry is added to the front of the intermediate, then the carry is reset and the intermediate is pushed to the end of the intermediate queue. Then the intermediate is added to the current product to find the total product, after this the current intermediate is reset and filled with zeroes depending on the current iteration. Finally, the loop counter is decremented and the loop continues.

Section 3: printResults()

This section simply prints out the results, trivial considering that the results are calculated and have been stored prior to using this method.

Section 4: printIntermediates()

This section prints out the intermediates by dequeuing them from the queue and printing until the queue is empty.

Helper Section 1: padString(s, length)

This section will loop until the length of the string, s, is equal to the target length, length. This is done with a simple loop, in the loop a ‘0’ is added to the front of the string. Finally, the padded string is returned.

Helper Section 2: sumNumbers(s1, s2)

This section will loop through both string, starting at the end, and at each character and carry together to find the result. The result and carry are adjusted and the result is joined to the front of the sum string. When the loop has ended, any remaining carry is added to the front of sum and sum is returned.

Proofs

Section 1: getInput()

Line 49-63

Pre-Condition

1. num1, num2 have been declared but not initialized

Post-Condition

1. num1, num2 have the user’s values

Proof

Trivial, prebuilt java class (Scanner) takes input and assigns to a variable.

Section 2: getProduct()