

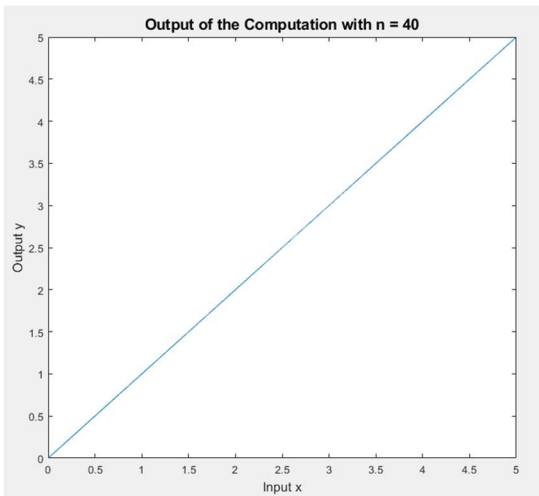
# Computing Assignment 1

Daniel Todd

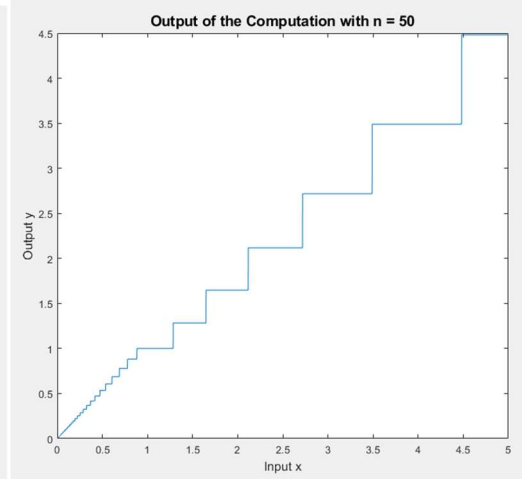
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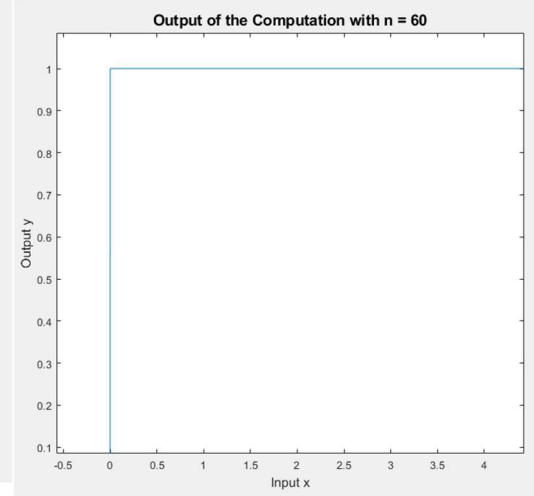
a) **Figure 1**



**Figure 2**

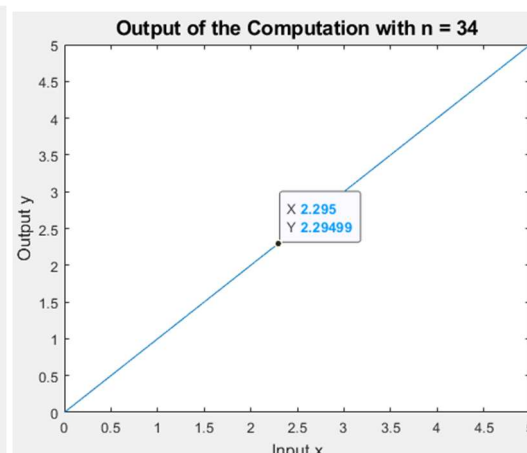
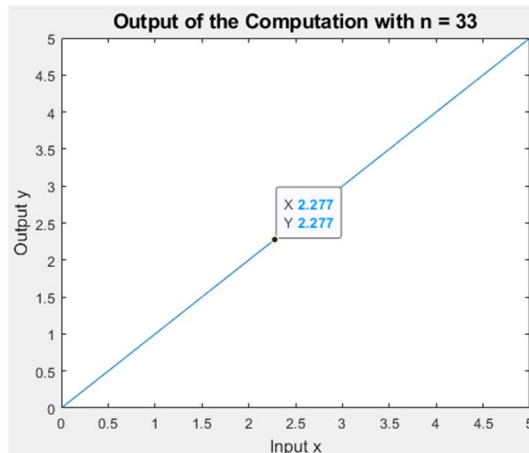
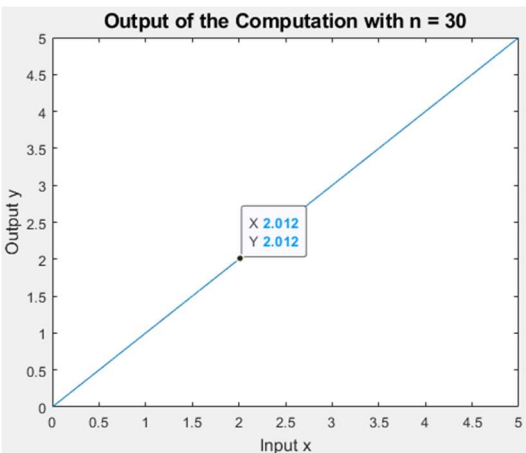


**Figure 3**



Here I plotted the difference between  $x$  and  $y$  as a curve for  $N = 40, 50$  and  $60$  respectively. I noticed that as  $N$  increases, the difference between  $x$  and  $y$  increases. Also, I noticed for higher values of  $x$  and  $y$ , the difference between  $x$  and  $y$  increases in a non-linear fashion. This suggests that this algorithm is not robust at keeping  $x$  equal to  $y$ .

b) Here I noticed that between  $n=30$  and  $n=40$  the  $x$  and  $y$  values begin to differ, so I tried a few values and pinpointed  $n=34$  to be approximately the point where the  $x$  and  $y$  difference becomes noticeable:



c) As seen in part a, the limiting behavior of the algorithm results in  $x$  and  $y$  becoming wildly differing values, suggesting an amplification of roundoff error. As such it is suggested that the limiting behavior as  $n$  approaches infinity of this algorithm results in infinite error, and  $y$  converges at 1.

d) As mentioned in part c, the amplification of roundoff error causes the absolute error between  $x$  and  $y$  to increase. This can be seen in figure 2 of part a, as the graph skews further from a linear curve as the values of  $x$  and  $y$  increase.