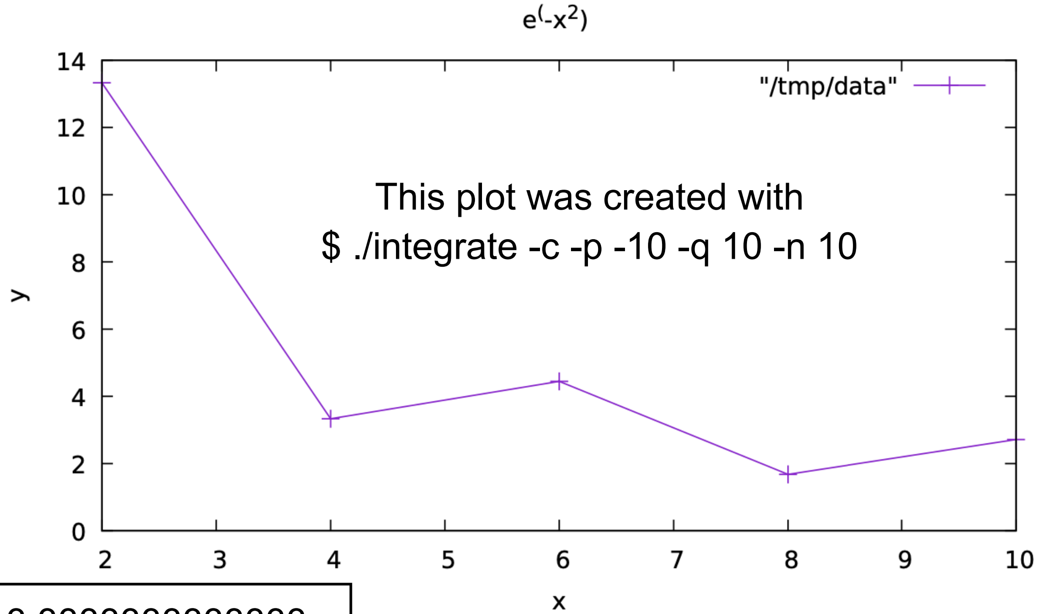
Guillermo Alfaro
CSE13S Winter 2022

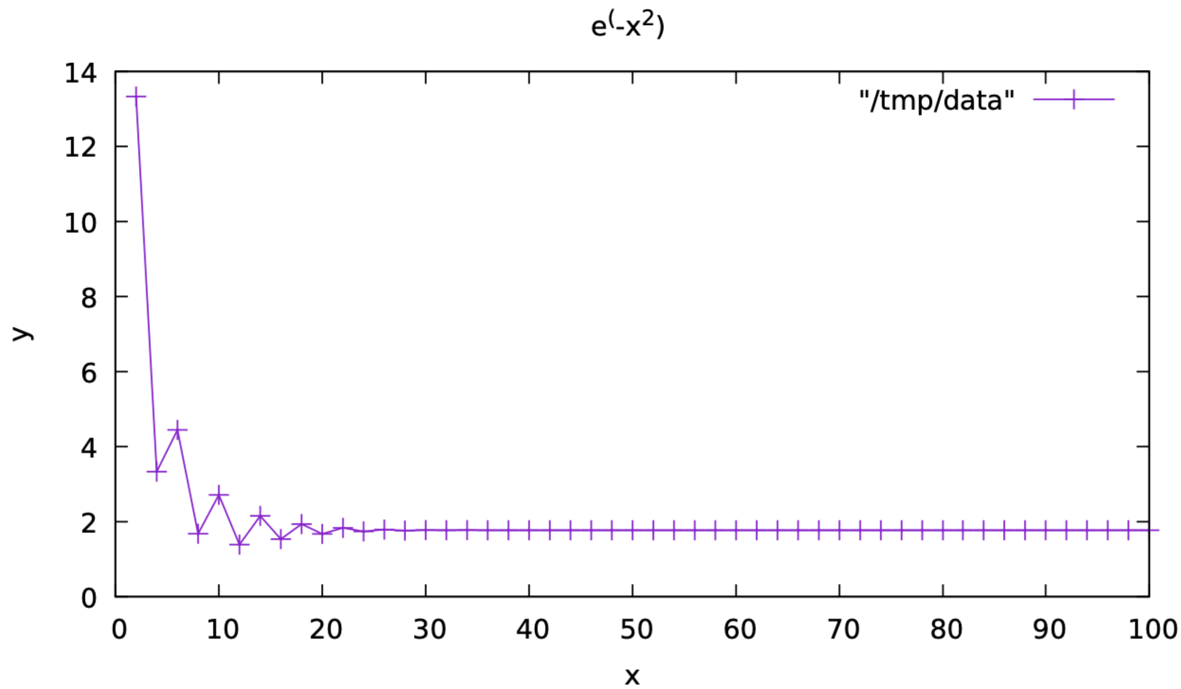
# Assignment 2: Numerical Integration Writeup



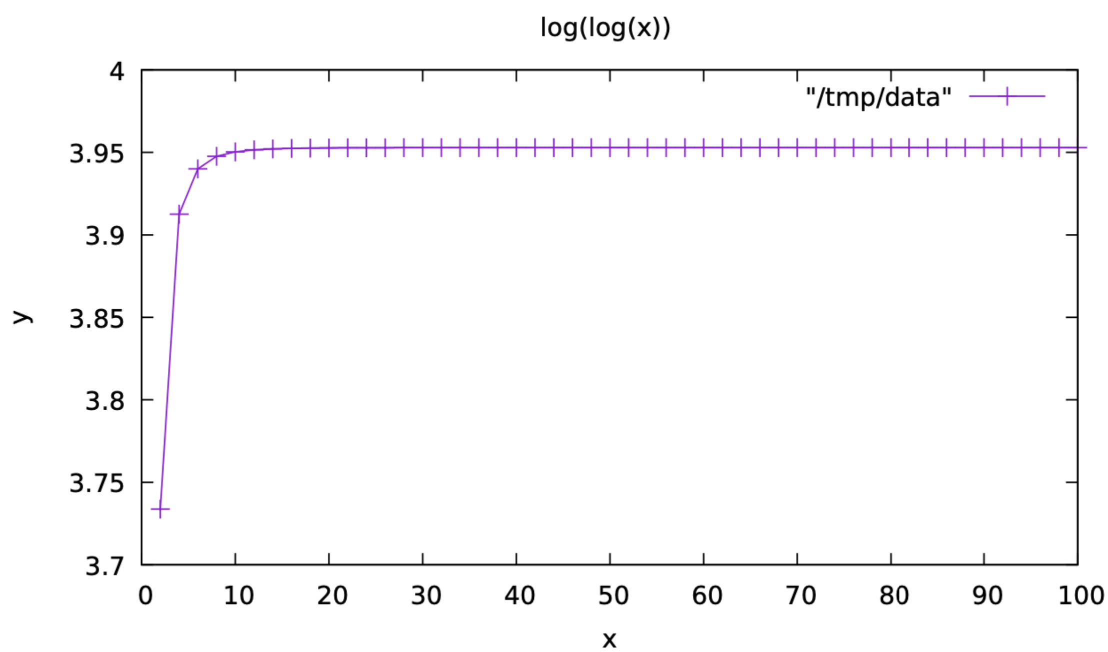

| | |
|---|---|
| 2 | 13.3333333333333 |
| 4 | 3.33333333351851 |
| 6 | 4.44451086817122 |
| 8 | 1.67953636095448 |
| 10 | 2.71550897055756 |

The e(-x^2) to me looks the most interesting as it shows Simpson's Composite ⅓ rule in action. Scoping across a curve calculating a new tangent line, in some areas it estimates a higher number than drops down creating these peaks in the graph. As the number n increases the more subintervals the integral is broken into the better approximation.

Increasing the number of subintervals creates this 'flatline' at 1.77 as seen in the graph below.




Log(log(x))'s graph has a curve that just appears out of thin air, this matches neatly when compared to how logarithmic graphs work and what the composite ⅓ rule is doing. Taking a tangent line at the start of a log would create an almost vertical line. The way this shows up by having a big beginning spike then a steady logarithmic increase over time is neat to see math acting how anticipated.



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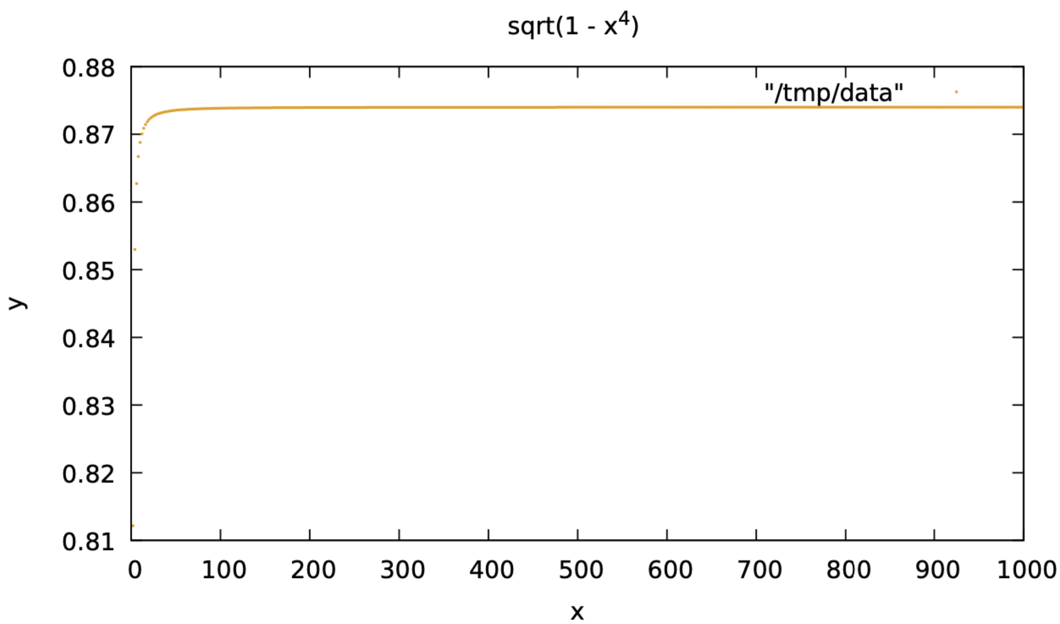
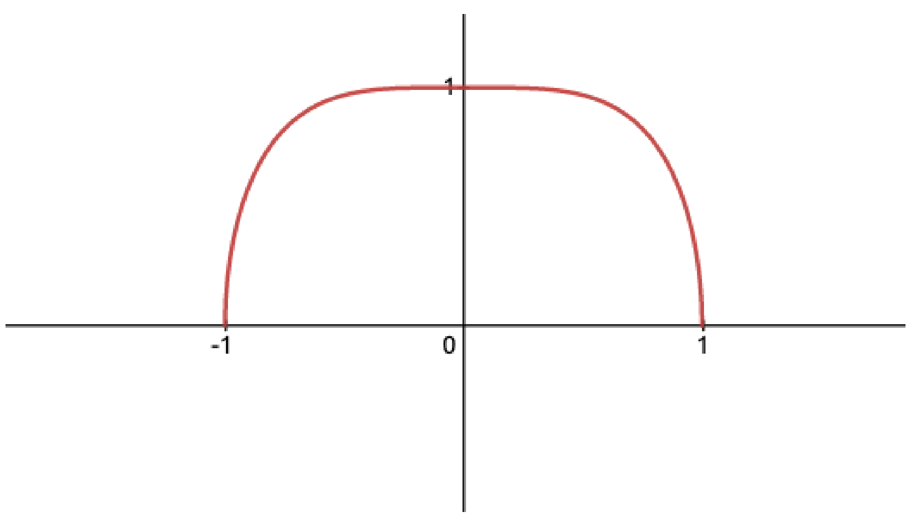
# Summary:

These graphs all show an approximation that becomes increasingly more refined the more subintervals provided. No matter which integral is used after 100 subintervals they flatline, and after 1000 there is no movement visually when plotted. The numbers do continue to change but it’s more and more precise and gets to a point where it’s unnecessary. Squeezing out the last few significant figures isn’t worthwhile.




y=sqrt(1-x^4) plotted in desmos.

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# Valuable takeaways:

This assignment taught me how to use header files and compile them together, also the importance of ordering functions before main(). It also reinforced learning how to use terminal and gnuplot is very important, it can really make the difference between an efficient and smart student versus one that is in a constant struggle. me:(

Learning how to properly use these tools and when to use them is just as important as getting the assignment done. A word of advice from myself to myself.