Assignment2 - WRITEUP.pdf

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Abstract

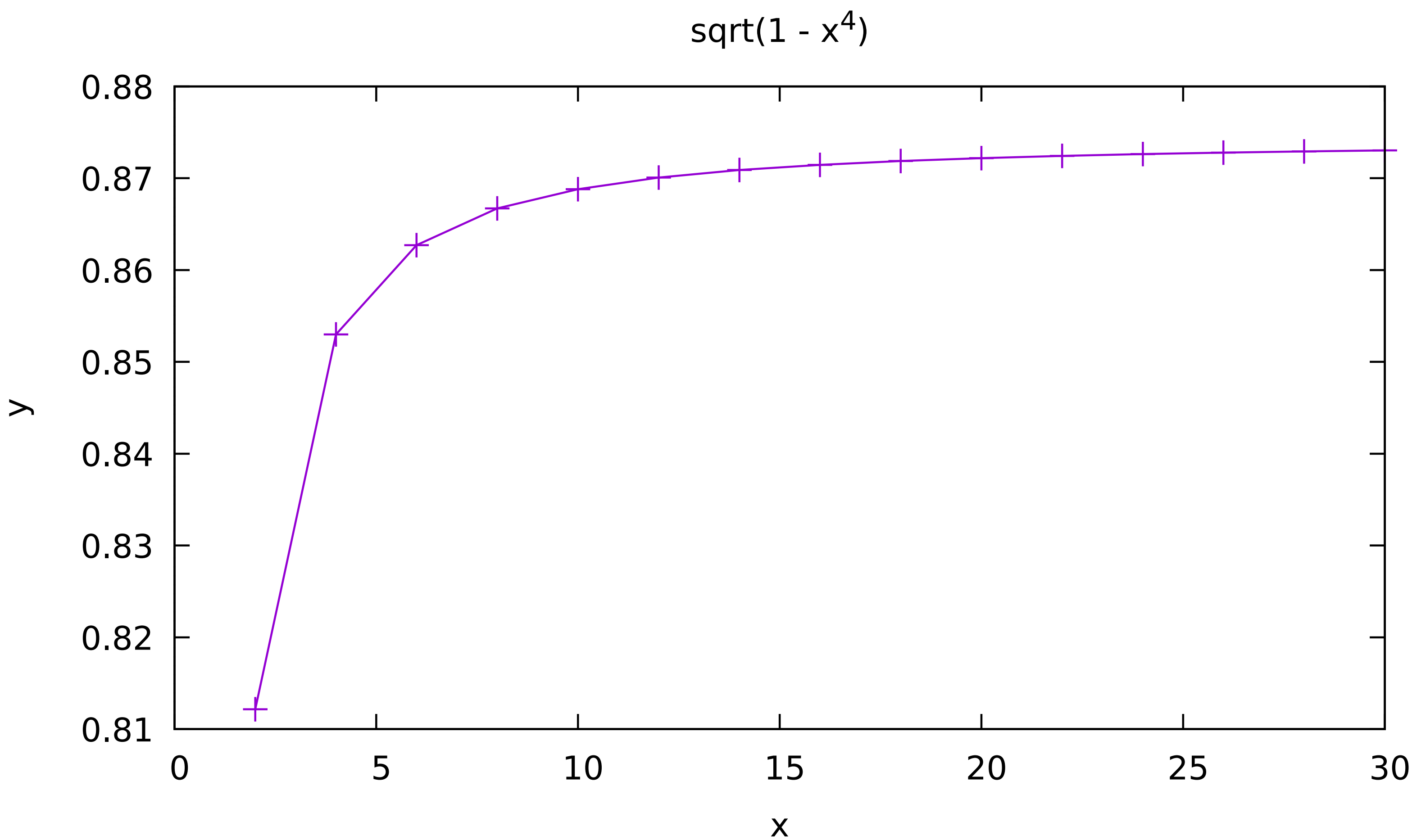
This writeup will include the plots that I produced using my bash script, as well as discussion on which UNIX commands I used to produce each plot and why am I chose to use the them.

1 Introduction

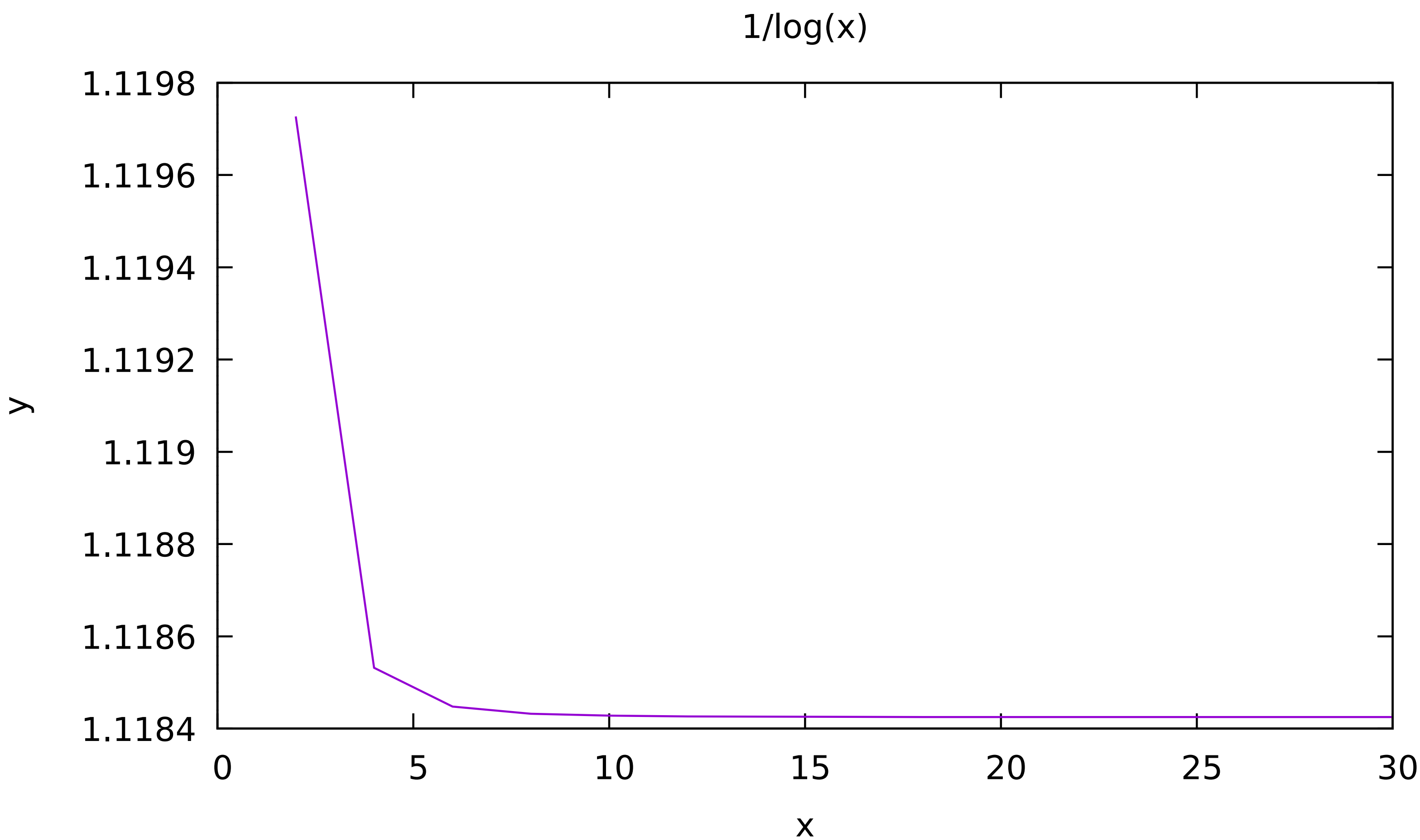
This WRITEUP.pdf will include 10 plots using gnuplots and the analysis of the produced graphs and any lessons that you learned about floating-point num-bers.

2 Figures

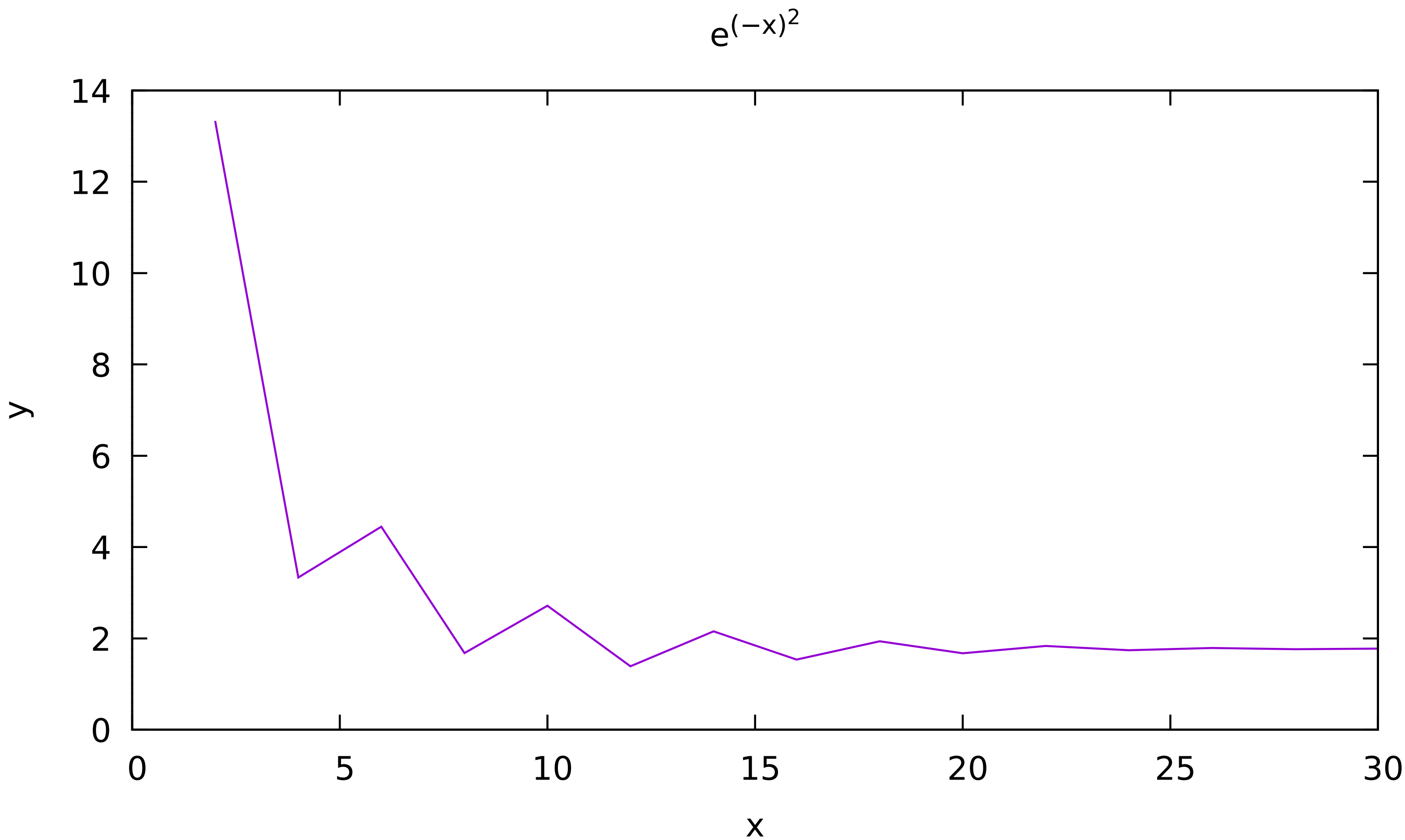
There are the ten plots that I produced using my bash script. I use Latex to to insert the PDF of my plots into this WRITEUP file.


sqrt(1 - x4)
0.88
0.87
0.86
0.85
0.84
0.83
0.82
0.81
y
0
5
10
15
20
25
30
x

Sets the function a to integrate. The low end of the interval to integrate is 0, the high end of the interval to integrate is 1 and the upper limit of partitions to use in the composite Simpson's rule to partitions is 30. According to Table 1 from asgn2.pdf the integral value should approach to 0.87401918476405, we can see from the plot that when partitions increase, the value of Integral value is closer to 0.87401918476405.

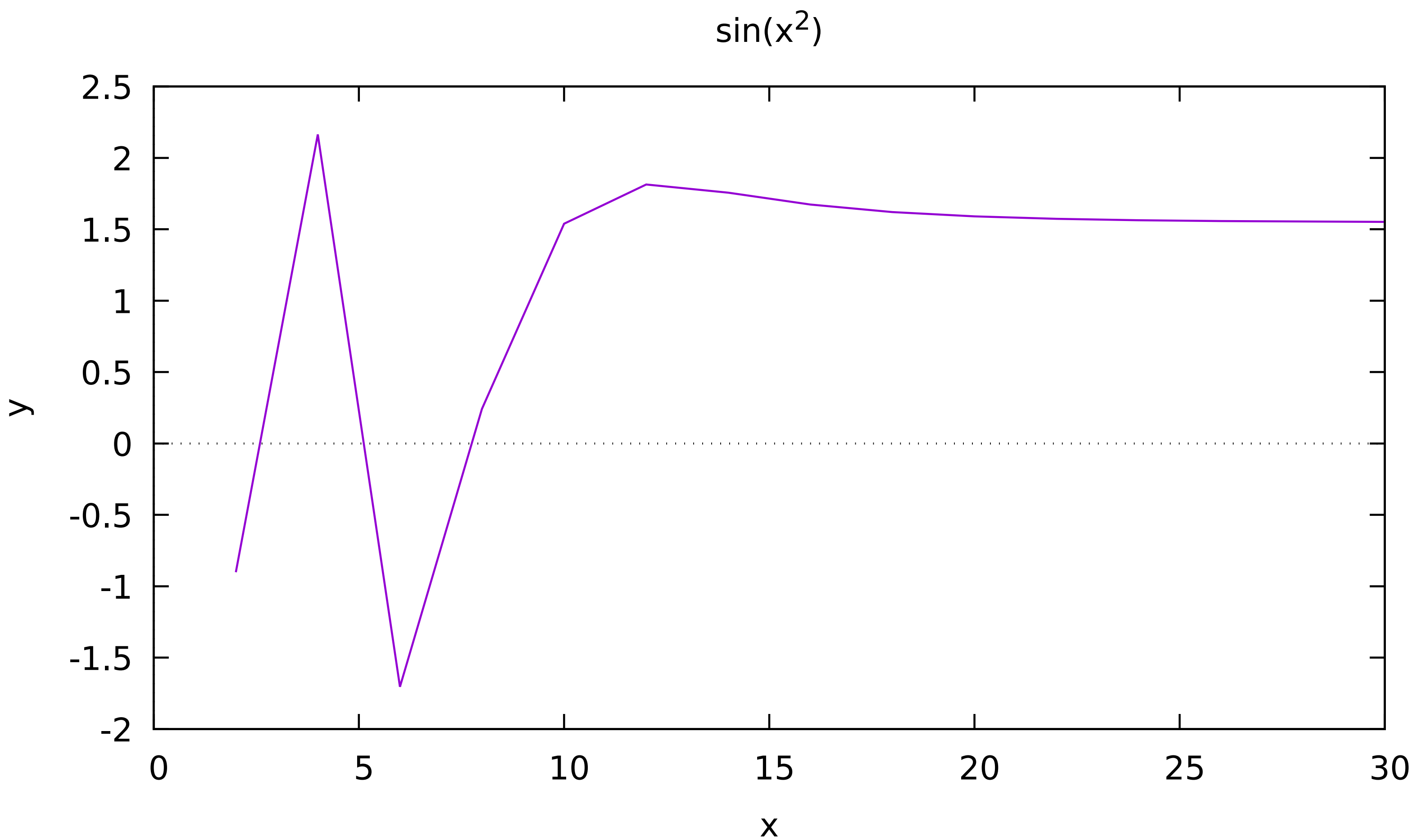

1/log(x)
1.1198
1.1196
1.1194
1.1192
1.119
1.1188
1.1186
1.1184
y
0
5
10
15
20
25
30
x

Sets the function b to integrate. The low end of the interval to integrate is 2, the high end of the interval to integrate is 3 and the upper limit of partitions to use in the composite Simpson's rule to partitions is 30. According to Table 1 from asgn2.pdf the integral value should approach to 1.118424814549702, we can see from the plot that when partitions increase, the value of Integral value is closer to 1.118424814549702.



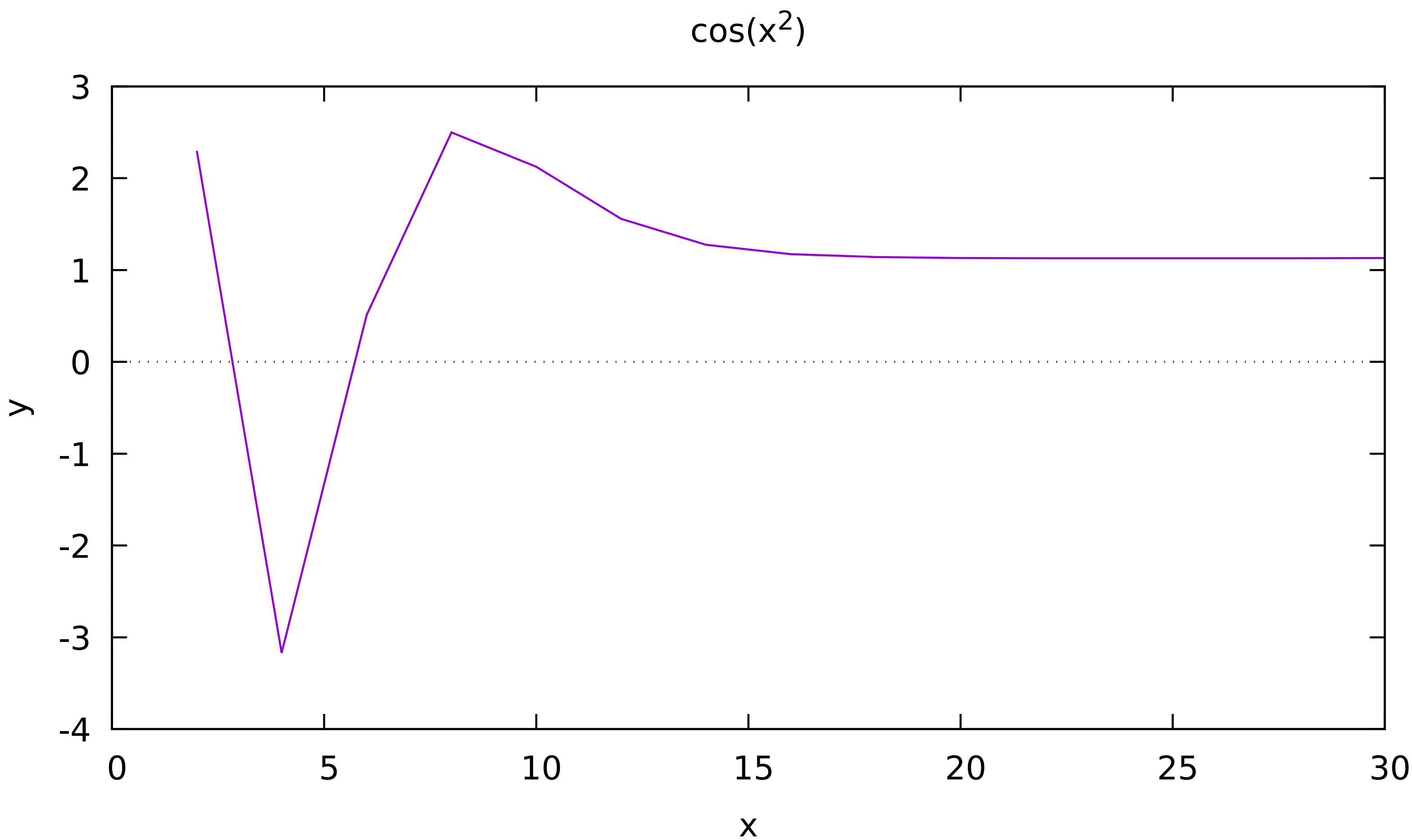
$e^{(-x)^2}$
14
12
10
8
6
4
2
0
y
0
5
10
15
20
25
30
x

Sets the function c to integrate. The low end of the interval to integrate is -10, the high end of the interval to integrate is 10 and the upper limit of partitions to use in the composite Simpson's rule to partitions is 30. According to Table 1 from asgn2.pdf the integral value should approach to 1.772453850905508, we can see from the plot that when partitions increase, the value of Integral value is closer to 1.772453850905508.



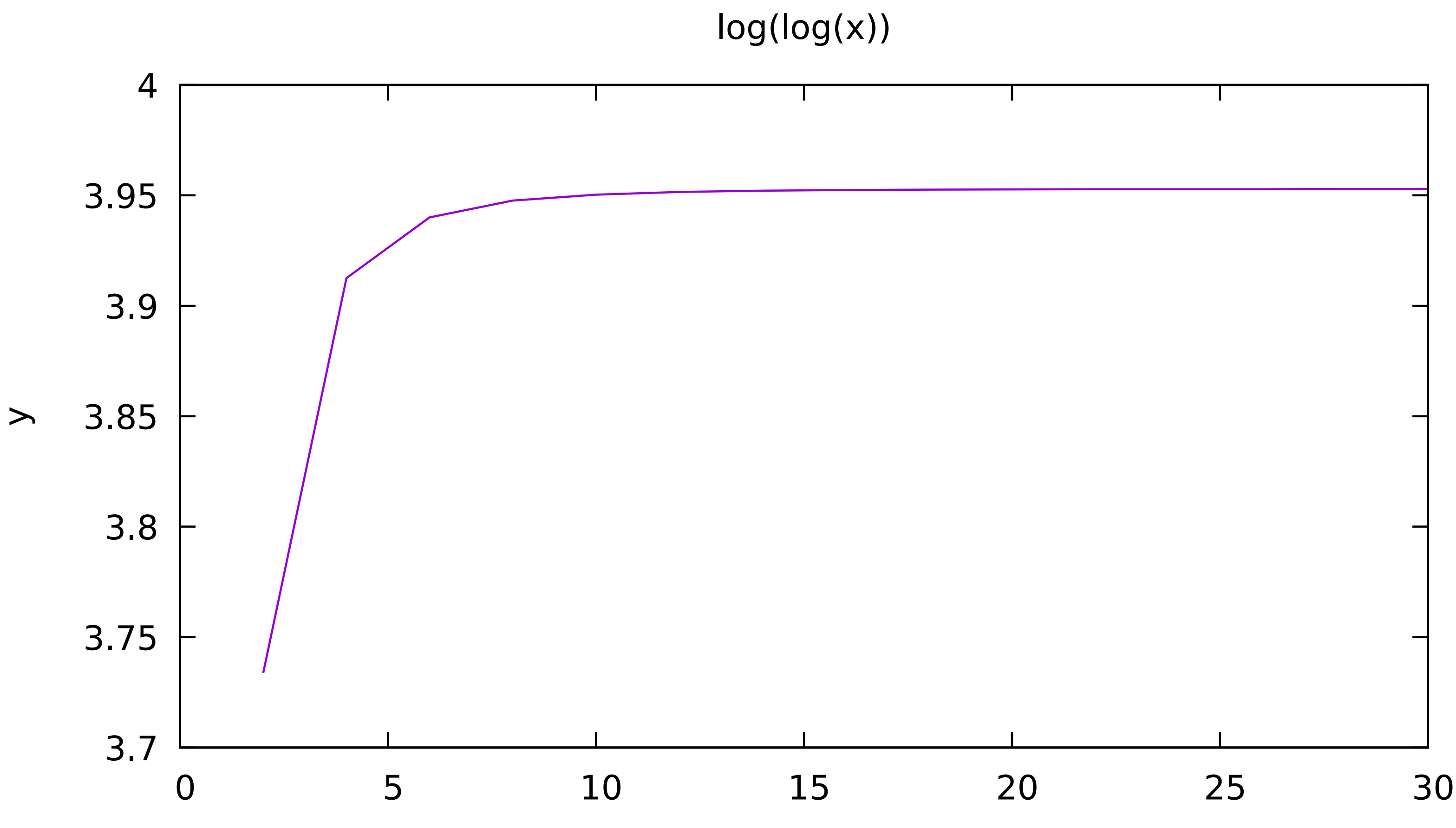
sin(x^2)
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
y
0
5
10
15
20
25
30
x

Sets the function d to integrate. The low end of the interval to integrate is -3.141593, the high end of the interval to integrate is 3.141593 and the upper limit of partitions to use in the composite Simpson's rule to partitions is 30. According to Table 1 from asgn2.pdf the integral value should approach to 1.545303425380133, we can see from the plot that when partitions increase, the value of Integral value is closer to 1.545303425380133.



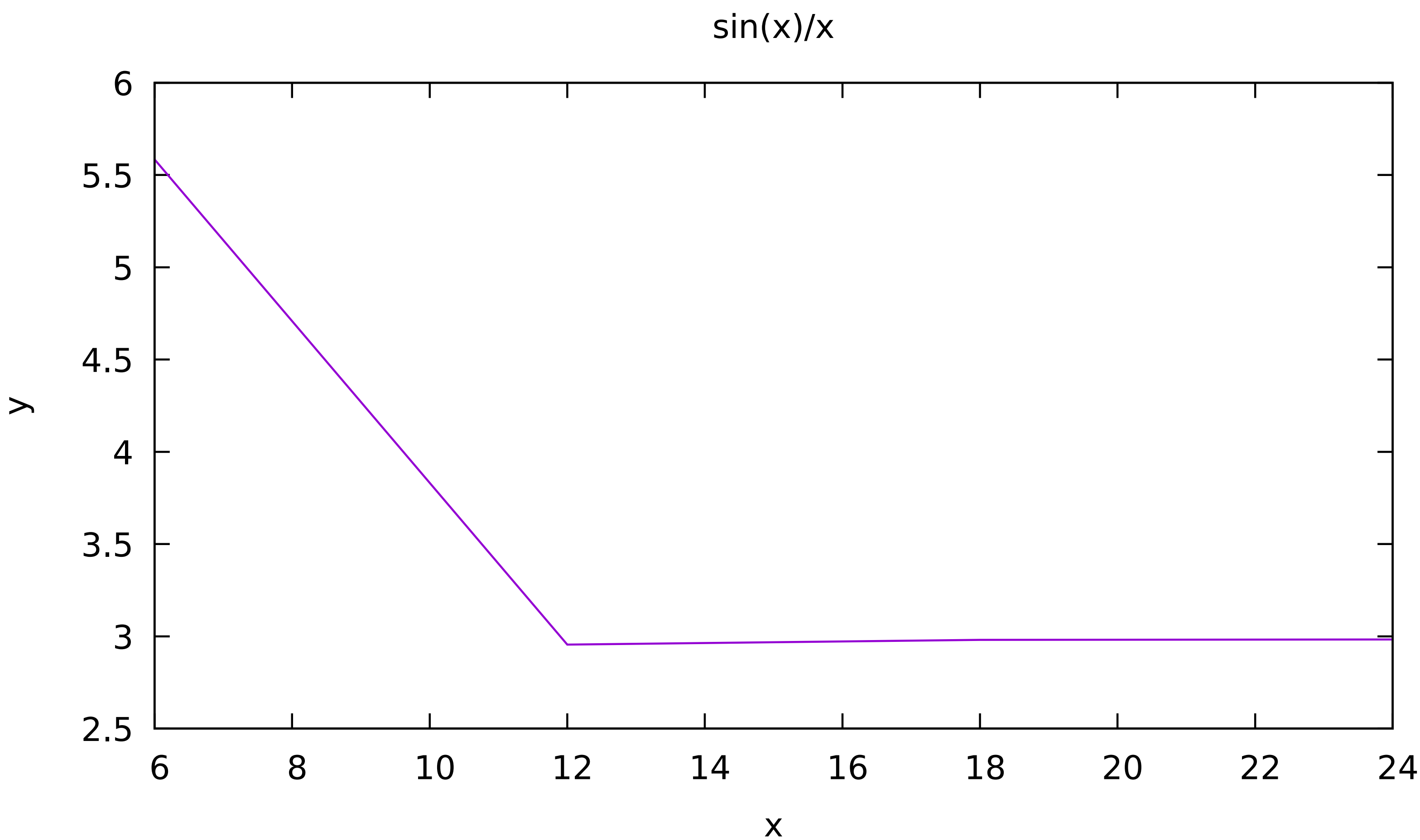
$\cos(x^2)$
3
2
1
0
-1
-2
-3
-4
y
0
5
10
15
20
25
30
x

Sets the function e to integrate. The low end of the interval to integrate is -3.141593, the high end of the interval to integrate is 3.141593 and the upper limit of partitions to use in the composite Simpson's rule to partitions is 30. According to Table 1 from asgn2.pdf the integral value should approach to 1.545303425380133, we can see from the plot that when partitions increase, the value of Integral value is closer to 1.545303425380133.

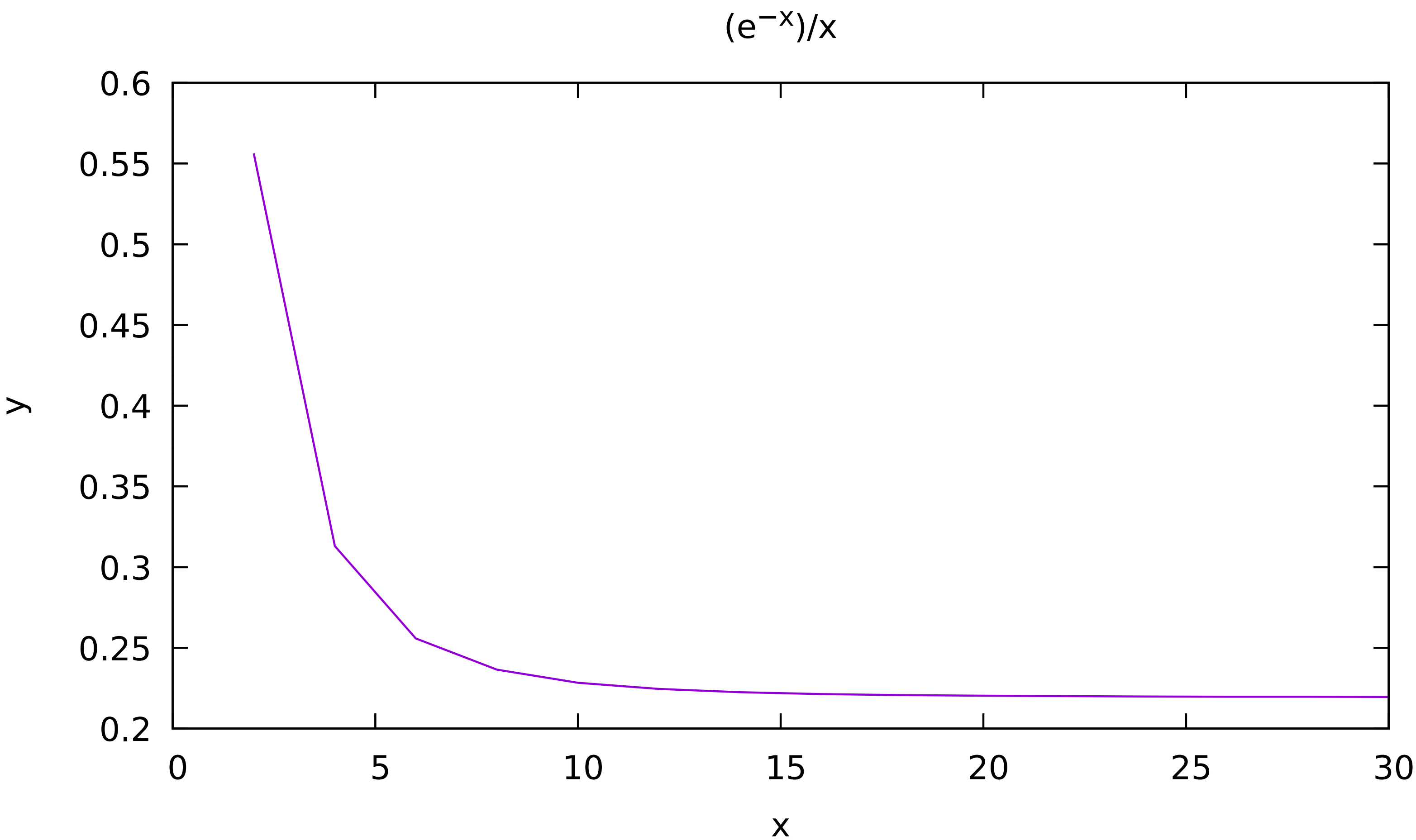


log(log(x))
4
3.95
3.9
3.85
3.8
3.75
3.7
y
0
5
10
15
20
25
30
x

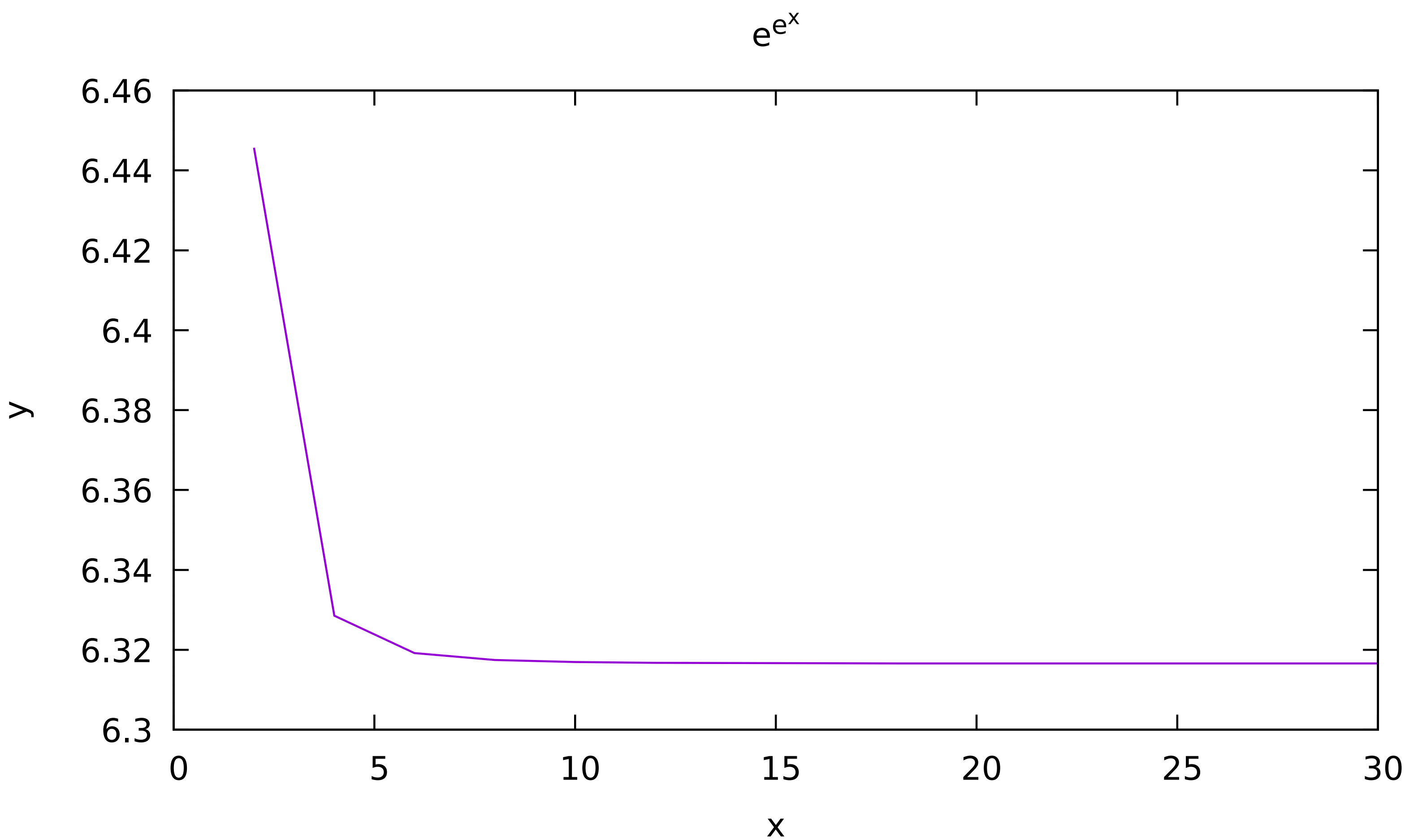
Sets the function f to integrate. The low end of the interval to integrate is 2, the high end of the interval to integrate is 10 and the upper limit of partitions to use in the composite Simpson's rule to partitions is 30. According to Table 1 from asgn2.pdf the integral value should approach to 3.952914142858876, we can see from the plot that when partitions increase, the value of Integral value is closer to 3.952914142858876.


sin(x)/x
y
x
6
5.5
5
4.5
4
3.5
3
2.5
6
8
10
12
14
16
18
20
22
24

Sets the function g to integrate. The low end of the interval to integrate is -12.566372, the high end of the interval to integrate is 12.566372 and the upper limit of partitions to use in the composite Simpson's rule to partitions is 30. According to Table 1 from asgn2.pdf the integral value should approach to 2.984322451168924, we can see from the plot that when partitions increase, the value of Integral value is closer to 2.984322451168924.

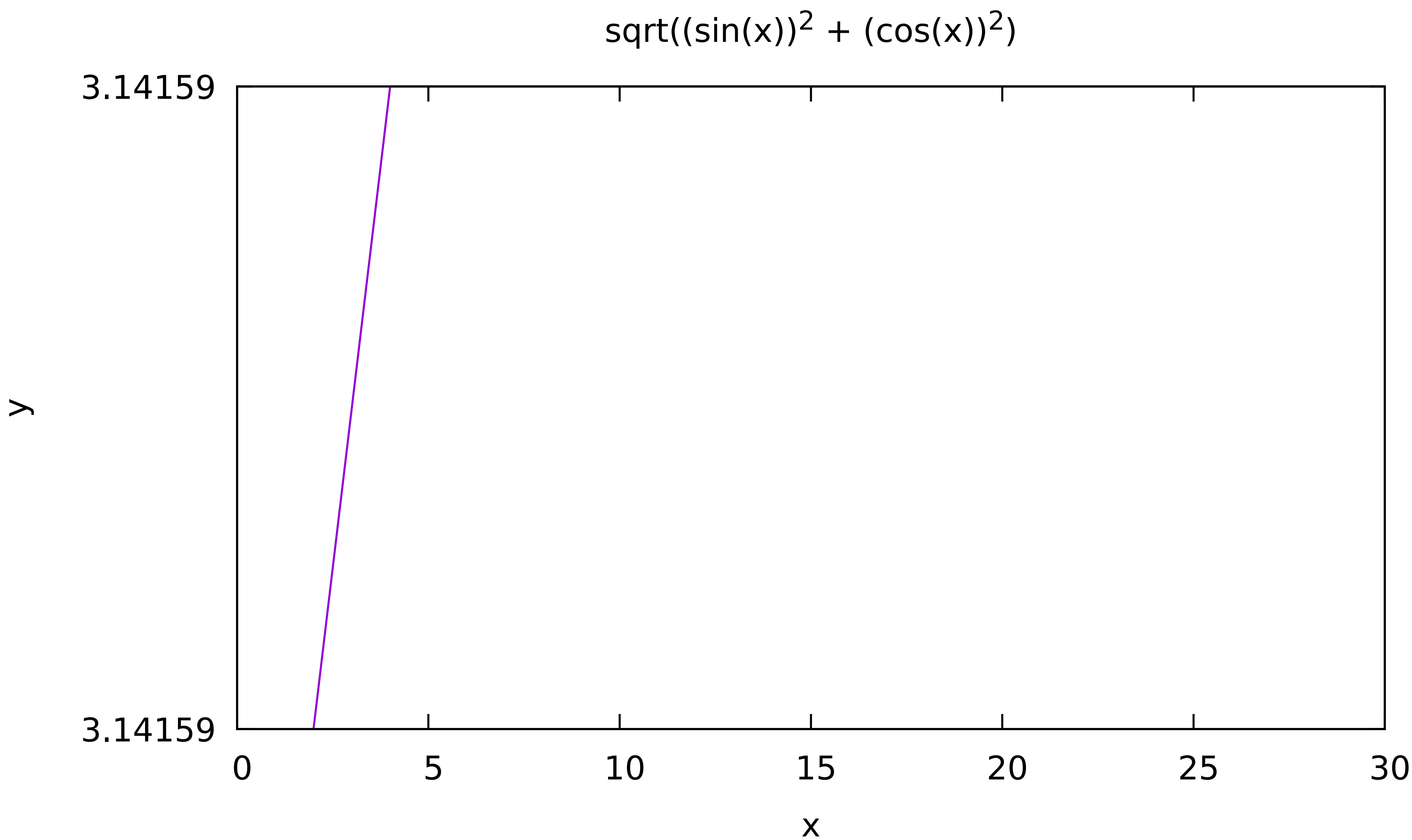

(e−x)/x
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
y
0
5
10
15
20
25
30
x

Sets the function h to integrate. The low end of the interval to integrate is 1, the high end of the interval to integrate is 10 and the upper limit of partitions to use in the composite Simpson's rule to partitions is 30. According to Table 1 from asgn2.pdf the integral value should approach to 0.2193797774265986, we can see from the plot that when partitions increase, the value of Integral value is closer to 0.2193797774265986.



e^{e^x}
6.46
6.44
6.42
6.4
6.38
6.36
6.34
6.32
6.3
y
0
5
10
15
20
25
30
x

Sets the function i to integrate. The low end of the interval to integrate is 0, the high end of the interval to integrate is 1 and the upper limit of partitions to use in the composite Simpson's rule to partitions is 30. According to Table 1 from asgn2.pdf the integral value should approach to 6.316563839027766, we can see from the plot that when partitions increase, the value of Integral value is closer to 6.316563839027766.


sqrt((sin(x))2 + (cos(x))2)
3.14159
3.14159
y
0
5
10
15
20
25
30
x

Sets the function j to integrate. The low end of the interval to integrate is 0, the high end of the interval to integrate is and the upper limit of partitions to use in the composite Simpson's rule to partitions is 3.141593. According to Table 1 from asgn2.pdf the integral value should approach to 3.141592653589797, we can see from the plot that when partitions increase, the value of Integral value is closer to 3.141592653589797.

3 Analysis of the produced graphs

- I set partitions to 30 which is enough to see the trend. From each graph, we can see that the y value tends to a number as the partition increases. This means that in Simpson's rule, as the partition increases, the integral becomes more precise.

4 lessons that I learned

- I learned how to use getopt() which can accept multiple command-line options.
- strtod() converts the string pointed to by the argument str to a floating-point number (type double).
- strtoul() converts the string pointed to by the argument str to a unsigned integer (type int).
- strtol() converts the string pointed to by the argument str to a signed integer (type int).
- we can use %0.x to define how many decimal places we need to keep. Foe example: %0.2 keep 2 decimal numbers.