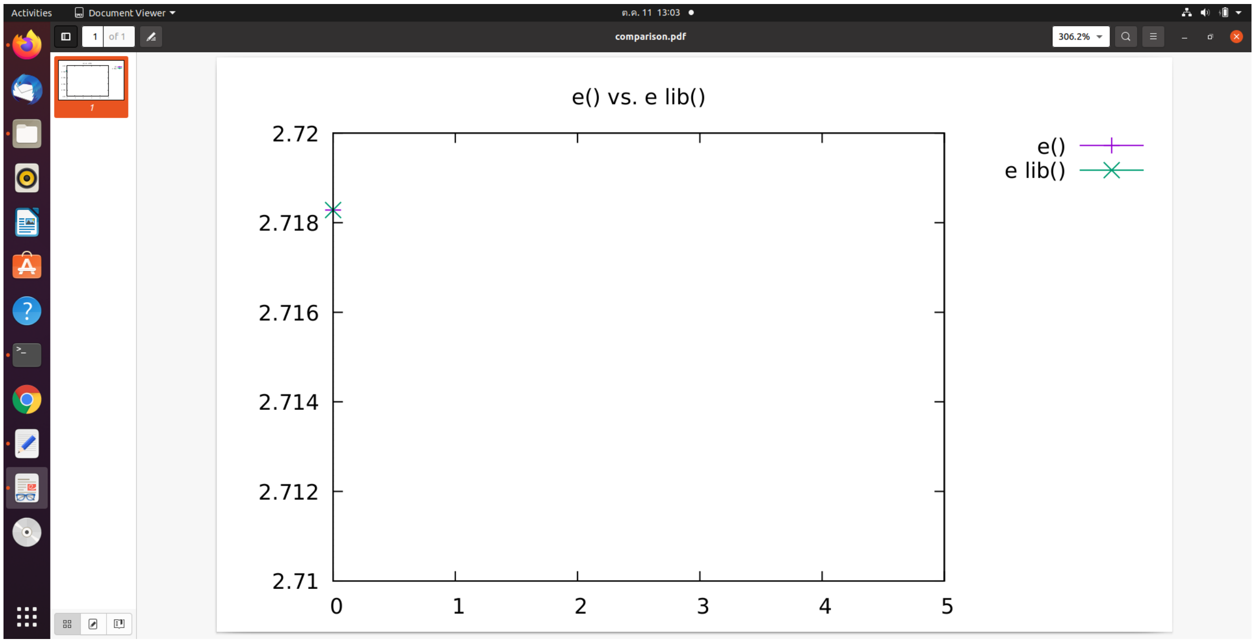
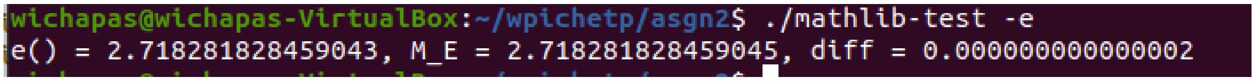
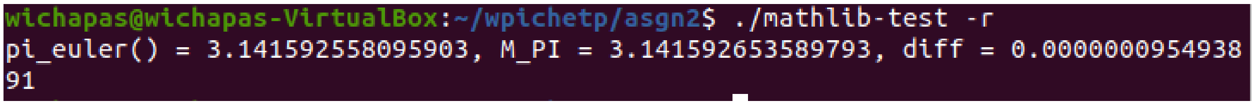
Attempted graph but incomplete:





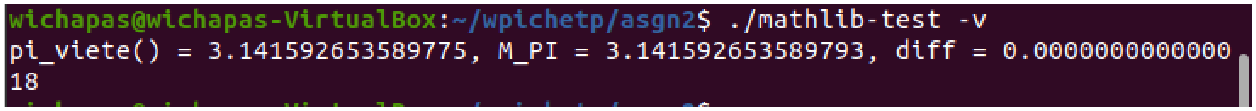
```
wichapas@wichapas-VirtualBox:~/wpichetp/asgn2$ ./mathlib-test -e
e() = 2.718281828459043, M_E = 2.718281828459045, diff = 0.000000000000002
```

As seen from the graph and the program output above, we can see that the formula is in fact really close to the actual library function. However, there is still a small difference even though test file output was a diff of 0. I later checked the number of terms of my formula and it was 17 compared to the test file being 18. So I have found out that this difference might have been caused by the term that is missing and was not counted towards the total



```
wichapas@wichapas-VirtualBox:~/wpichetp/asgn2$ ./mathlib-test -r
pi_euler() = 3.141592558095903, M_PI = 3.141592653589793, diff = 0.0000000954938
91
```

As seen from the screen shot above, there is quite a big difference compared to the math library. Checking with the test files, this is exactly the same output and diff. So it is clear that this euler formula is not a very good approximation compared to the other formulas. As seen in the formula, we only had to find the summation of 1 divided by k to the power of 2. Also, this formula had k starting at 1 thus leading to an approximation that is not as accurate as others.



```
wichapas@wichapas-VirtualBox:~/wpichetp/asgn2$ ./mathlib-test -v
pi_viete() = 3.141592653589775, M_PI = 3.141592653589793, diff = 0.0000000000000
18
```

As seen from the screen shot above, there is a little difference so this formula has been proven to be a good approximation. Especially, if we look at the formula, the formula gets slightly more complicated than euler and starts k at 0 but it provided us with a better approximation of pi.

My madhava output was a little different compared to the test file but it was still within the epsilon limit. However, the diff was not completely 0 so it is safe to assume that this is a pretty good tool of approximation as it is better than pi-viete and euler.