

The Report for Programming Assignments in Chapter Four

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1 How to Test

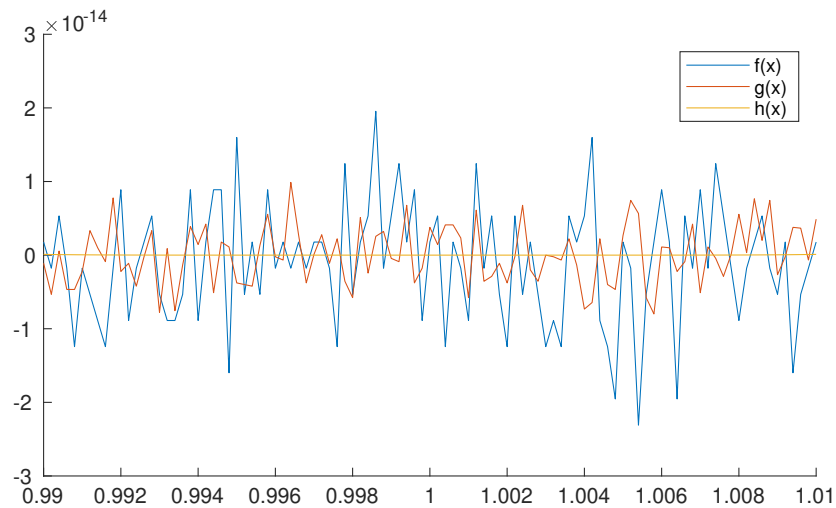
Enter the folder `Programming-Chapter4/src` with terminal, make here, you will see some executable files whose names are corresponding assignments. Run them directly and you will see the results.

To get the figures in this report, run `drawA.m` and `drawB.m` with **matlab**.

2 Results

2.1 Assignment A

Please see the numerical result in `Programming-Chapter4/src/A.txt`. We plot it here.



We could see that $f(x)$ and $g(x)$ have strong oscillation. And $h(x)$ is the most accurate, $f(x)$ is the least accurate.

The reason is that we did lots of additions and subtractions of numbers which are very close in $f(x)$ and $g(x)$. And that caused catastrophic cancellations. However $h(x)$ only did subtraction once when calculate $x - 1$. So $h(x)$ is much more accurate.

2.2 Assignment B

We consider the normalized FPN system \mathbb{F} with $\beta = 2, p = 3, L = -1, U = 1$.

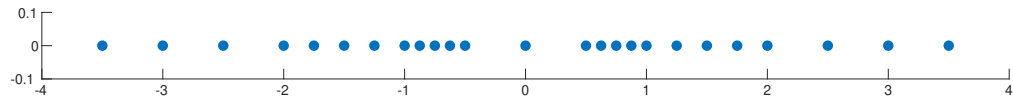
(i) $\text{UFL}(\mathbb{F}) = 0.5$, $\text{OFL}(\mathbb{F}) = 3.75$.

(ii) The numbers in \mathbb{F} are listed here.

```
-3.5 -3 -2.5 -2 -1.75 -1.5 -1.25 -1 -0.875 -0.75 -0.625 -0.5
0 0.5 0.625 0.75 0.875 1 1.25 1.5 1.75 2 2.5 3 3.5
```

There are 33 numbers, which supported the corollary on the cardinality.

(iii) See the numbers in \mathbb{F} in the following figure.



(iv) The subnormal numbers of \mathbb{F} are listed here.

```
-0.5 -0.375 -0.25 -0.125 0 0.125 0.25 0.375
```

(v) See the numbers of extended \mathbb{F} in the following figure, where blue points are normal numbers and red points are subnormal numbers.

