

Computational Physics Laboratory 2022

Class No. 1 (08/08/2022)

Start Jupyter Notebook

>jupyter notebook &

Getting Started - Download and run [this](#) notebook.

Problems:

Problem 1. Encode the following algorithm and run it to determine the smallest positive number that can be represented on the computer you are using:

```
input s <--- 1.0
for k=1,2,3,...,100 do
    s <--- 0.5 s
    t <--- s + 1.0
    if t <= 1.0 then
        s <--- 2.0 s
        output k-1, s
        stop
    endif
end
```

Do this for both single precision and double precision floating point numbers.

Problem 2: Evaluate the expression $y=(x^2 + 1.0)^{(0.5)}-1.0$ in two ways

(a.) $y <- (x^2 + 1.0)^{(0.5)}-1.0$ A

(b.) $y <- x^2/[(x^2+1.0)^{(0.5)}+1.0]$ B

for small values of x, $x=0.1, 0.01, 0.001, 10^{-4}, \dots$ and evaluate the fractions deviation $(A-B)/B$. Plot the fraction deviation as a function of x on a log-log plot.

Which method do you expect to be superior, and why?