Scientific Computing 1
3rd worksheet for online events
12/03/2020

"When reading the code in about six months and asking yourself: who wrote this crap?
The answer should not be: YOU!"

Basically that means:

- Try to always use meaningful names for functions, variables, . . .

- Write documentation wherever necessary.

- Use indentation to increase readability of the code.

- Add a short statement describing its purpose and basic behavior to each function.

- . . .

Exercise 1:

Determine the absolute and the relative condition numbers of

- a.) $f(x) = \sin(x)$,

- b.) $f(x) = \arctan(x)$,

- c.) $f(x) = \sqrt{x \exp(x)}, \quad x > 0$.

Which values of x will lead to high condition numbers?

Exercise 2:

Reformulate the following expressions to avoid cancellation:

- a.) $\sqrt{1+x} - 1, \quad x \approx 0$

- b.) $\frac{1-\cos x}{\sin x}, \quad x \approx 0$

- c.) $\frac{1}{1+2x} - \frac{1-x}{1+x}, \quad x \approx 0$

Exercise 3:

Determine the absolute and the relative error of 0.5403023059 and π in

- a.) $\mathbb{M}(10, 3, -2, 2)$

- b.) $\mathbb{M}(2, 3, -2, 3)$

- c.) $\mathbb{M}(2, 5, -2, 2)$

- d.) IEEE 754 half precision