

Numerical Analysis - Homework 5

Professor:

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Office Hours:

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Homework Problems

You should attempt all these problems before class, but we will work on them in class with our groups.

- Respond to the questions or prompts in the Jupyter Notebook from class: ErrorNumerical-Methods.ipynb
- Consider the following code:

```
import numpy as np

x=2
N=60

for i in range(N):
    x=np.sqrt(x)

for i in range(N):
    x=x**2

print(x)
```

1. What should this code do?
 2. What should it print at the end?
 3. Now program this in python. Does it print what you would expect? Is there any value of N that will give you the result you expect?
- Consider Stirling's Famous approximation for the factorial function

$$n! = n^n e^{-n} \sqrt{2\pi n}$$

1. Write python code that evaluates the accuracy of this approximation.
2. You should use `np.factorial(n)` to calculate the "true" factorial
3. Make a pandas table that lists n , the true value of $n!$, the approximate value, the absolute error, and the relative error for $n = 1, 2, 3, 4, \dots, 20$
4. Does the approximation get better or worse as n increases?