3. Numerics and a Bit More Central Limit Theorem

Present your solutions to the following problems using latex, if you have figures make sure they are publication quality, include your code in the solutions. Print your pdf files and bring them to class.

1. Use the same set up we used to prove the central limit theorem (there is, however, no need for the stationary phase approximation) to derive the probability distribution for $\hat{y}$ where $\hat{y} = \hat{x}_1 + \hat{x}_2$, and x_1 and x_2 are distributed according to $N(\mu_1, \sigma_1)$ and $N(\mu_2, \sigma_2)$ respectively.

2. Evaluate the following continued fraction representation of π using P_{NN} Padés. Plot the error vs. N up to $N = 30$. Comment on your plot.

$$\frac{\pi}{4} = \cfrac{1}{1 + \cfrac{1^2}{3 + \cfrac{2^2}{5 + \cfrac{3^2}{7 + \ddots}}}}.$$

3. Use the quotient-difference algorithm and Padé approximants to approximate $\exp(-x)$. Plot the relative error vs. x for the 5th and 10th approximants.