Solutions for Assignment h1

1. By Taylor’s theorem, $e=\sum\_{k=0}^{n}\frac{1}{k!}+\frac{e^{c}}{\left(n+1\right)!}$.

The problem asks finding the minimum n such that

$$\frac{e^{1}}{\left(n+1\right)!}<\frac{6}{10}×10^{-20}$$

$$Answer:n=21$$

1. Compute Fibonacci numbers F(41), F(42), …, F(47), where F(1)=F(2)=1.

Hint: by the following Matlab code

% h1p2.m - Matlab Code for Computing Fibonacci Numbers

F=int64(zeros(50)); H=int64(zeros(50));

F(1)=1; F(2)=2;

for k=3:47

 F(k)=F(k-1)+F(k-2);

end

s=(1+sqrt(5))/2; t=(1-sqrt(5))/2;

for j=1:47

 H(j)=int64((s^(j+1)-t^(j+1))/sqrt(5));

end

format rat;

A=[F(41:47); H(41:47)]

% Answers by the Recursive Formula

267914296 433494437 701408733 1134903170 1836311903 2971215073 4807526976

% Answers by Solving Recurrence Equation and a Root Representation

267914296 433494437 701408733 1134903170 1836311903 2971215073 480752697

3.

$$\left(a\right) x\_{n}=\left(n-1\right)!$$

$$\left(b\right) x\_{n}=\frac{n^{2}-n+2}{2}$$

$$\left(c\right) x\_{n}=2n-1$$

5. (i) X1=99999.999990, X2=0.000010

 (ii) X1=2.000977, X2=1.999023

 (iii) X1=1971.605924, X2=0.050771