**Problem:** The Maclaurin series expansion for cos x is:

(1)

Starting with the simplest version, cos x = 1, add terms one at time to estimate cos(π /3). After each new term is added, compute the true and approximate percent relative errors. Use your pocket calculator to determine the true value. Add terms until the absolute value of the approximate error estimate falls below an error criterion conforming to two significant figures.

**Solution:** I used matlab coding in a script file to solve this problem.

Here are my answers:

***Approximate Error***

100 121.391441302213 9.98563898380532 0.366353197463768 0.00717361458189889

***True relative Error***

1 9.66227112321509 0.359240300036179 0.00708693421748174 8.66865829785013e-05

***F(x) approximation***

1 0.451688644383925 0.501796201500181 0.499964565328913 0.500000433432915

Here is my code:

%% Problem 3(book 4.1)

clear all; close all; clc;

trueval = cos(pi/3);

ed = .01;

ea = 100;

et = 1;

n = 2;

xold = 1;

x = 1;

xa(n/2)=x;

eaa(n/2) = ea;

eta(n/2) = et;

while ea>+ed

x = x+(-1)^(n/2)\*((pi/3)^n)/factorial(n);

xa(n/2+1) = x;

ea = abs((x-xold)/x)\*100;

eaa(n/2+1) = ea;

et = abs((x-trueval)/(trueval))\*100;

eta(n/2+1) = et;

n = n + 2;

xold = x;

end

n = n/2;

fprintf('x=%u ea=%u et=%u n=%u\n',x, ea, et, n);