

THE PROBLEM

Matlab

Write a program in Matlab to implement the function

1. Cos (x) using the series expansion :

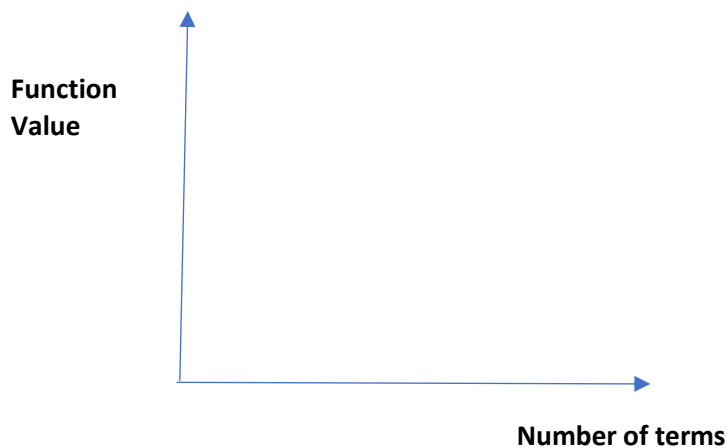
$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} - \dots$$

2. sin (x) using the series expansion :

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} - \dots$$

Where “x” takes the value in radians.

You are required to plot the following:



Activity:

1. Consider the number of terms starting from 2 to atleast 20 terms of the series
2. For cos x, the “1” is considered as a term.
3. For each “number of terms” get the function value.
4. Get plots for sinx, cos x and tanx separately.
5. Identify the number of terms required to arrive at a “convergent value”, that is , it may/may not be, the correct value, but the value doesn’t change after that for any increase in number of terms.
6. For “x” consider the values :

$$0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}, \frac{2\pi}{3}, \pi, 2\pi, 0.429\pi, 0.683\pi$$

7. A single plot can contain graphs of 5 “x” values
8. So for sinx there will be two plots, and so on. So finally we need 6 plots ., with proper “legend” marking and appropriate colours.