

---

# Assignemnt

Maclaurin Series

```
% Name      : Mohamed Mafaz
% Roll Number : AM25M009
% Depatment  : Applied Mechanics

clc
clear

number = 0.2*pi;    % x: where we want to find e(x)

plot_arr = [];      % To plot relative error wrt to itterations

tolerence = 5e-9;

sum = 1;
loop_completed = 0;
maximum_loops = 100; % So i can break out if the code goes to an infinite
Loop, mostly for debugging

actual = exp(number);
```

## Maclaurin Series

```
i = 1;    % Starting from 2nd factor, since 1 is always present

while 1
    sum = sum + power(number, i) / factorial(i); % maclaurin series

    relative_error = abs((actual - sum)/actual); % Relative error: |x_true
- x| / x_true
    plot_arr = [plot_arr, relative_error];      % Storing error since i
want to plot it

    if (relative_error) < tolerance;             % Comparing float is
generally not a good idea for extremly small numbers due to machine precision
% But since error arent
that small it wont cause issues.
        break
    end

    loop_completed = loop_completed + 1;          % Loops are kept track of

    if loop_completed >= maximum_loops          % Refer line 16
        break
    end
```

---

```
    i = i + 1;  
end
```

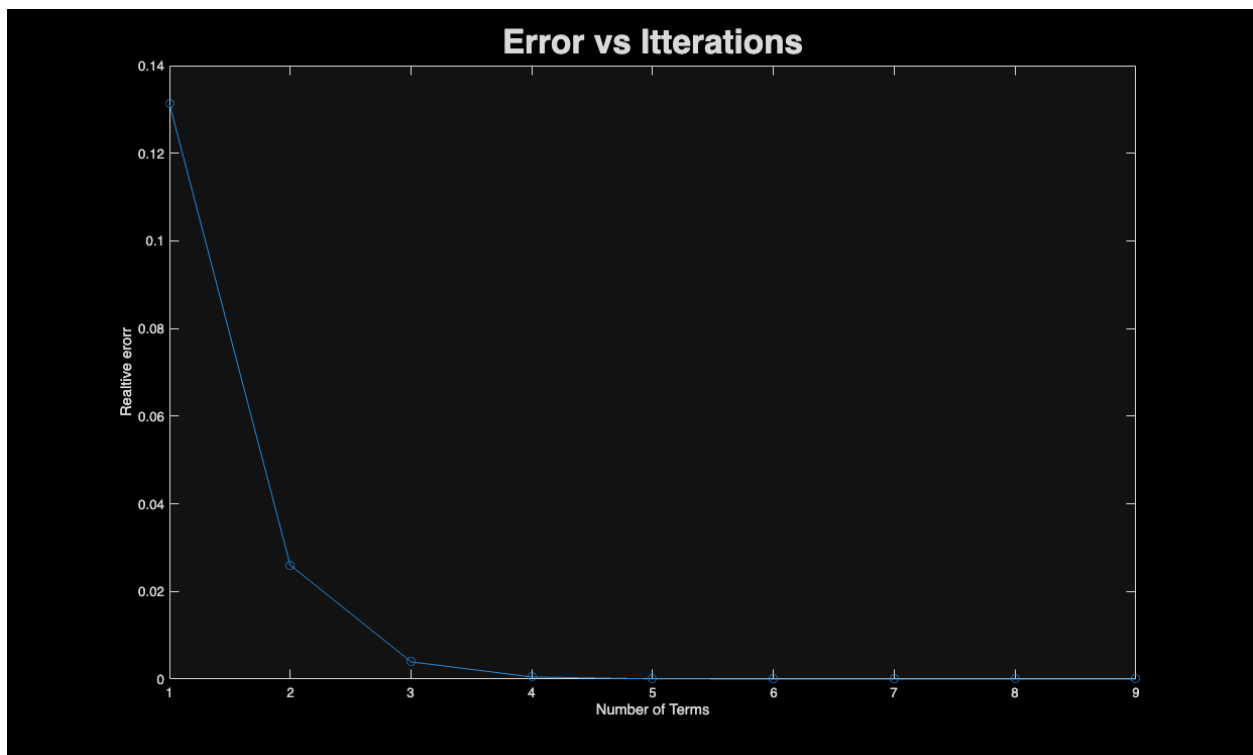
## Printing Stats

```
fprintf("relative_error: %.10f\n", relative_error)  
fprintf("Terms used      : %d\n", loop_completed+1)  
fprintf("Predicted       : %.10f\n", sum)  
fprintf("Actual          : %.10f\n", exp(number))
```

```
relative_error: 0.0000000015  
Terms used      : 9  
Predicted       : 1.8744560848  
Actual          : 1.8744560876
```

## Plotting Relative error

```
plot(1:length(plot_arr), plot_arr, '-o');  
title('Error vs Iterations', 'FontSize', 25)  
xlabel("Number of Terms")  
ylabel("Relative error")
```



*Published with MATLAB® R2025a*