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**Question: 2. (15 points)** The Maclaurin series expansion of  $\sin(x)$  is given by

Matlab Help

I understand and already did 2a. Need help with the Matlab part (2b).

2. (15 points) The Maclaurin series expansion of  $\sin(x)$  is given by

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

- (a) Use the first three terms in this equation to calculate the value of  $\sin(\pi/3)$ . Use your calculator to estimate the true value of  $\sin(\pi/3)$ . Calculate the truncation error (true percent relative error).
- (b) Now write a MATLAB program that adds the terms until the approximate percent relative error (error between current and previous estimate) falls below 0.01%. Document the final value, the percent relative error (approximate and true), and the number of iterations it took.

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## Expert Answer



**Anonymous**

answered this

### MATLAB Code

```

clear all
close all
%value of x=pi/3
x=pi/3;
%true value of sin(x)
t_value=sin(x);

```

```

%initializing approximation vector
a_value=0;
%display the headers
fprintf('Iteration\tTrueValue\tEstimate\tRel_Error(%%)\n')
%Loop to approximate the Maxlaurin series
for i=1:20
a_value=a_value+(-1)^(i+1)*x^(2*i-1)/factorial(2*i-1);
rel_error=abs(t_value-a_value)/t_value;
if (rel_error)<0.01/100
break
end
fprintf('\t%1.0f\t\t%1.4f\t\t%1.4f\t\t%1.4f\n',i,t_value,a_value,rel_error*100)
end
fprintf('\t%1.0f\t\t%1.4f\t\t%1.4f\t\t%1.4f\n',i,t_value,a_value,rel_error*100)

```

### Output on the command prompt

Iteration	TrueValue	Estimate	Rel_Error(%)
1	0.8660	1.0472	20.9200
2	0.8660	0.8558	1.1806
3	0.8660	0.8663	0.0312
4	0.8660	0.8660	0.0005

0 Comments

Was this answer helpful?



0



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## Up next for you in Electrical Engineering

Create a filter that takes a signal and filters it into three different outputs. The outputs being low pass, band pass and high pass. The cutoff frequency for low pass is 50Hz, for the high pass 1K

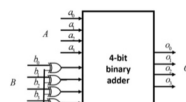
[See answer](#)

Task #1 Binary Adder/Subtractor. A request is received to design an adder/subtra...

#### Task #1 Binary Adder/Subtractor.

A request is received to design an adder/subtractor module with an input mode M which directs us to perform the addition  $O=A+B$  when  $M=0$  of the two four bit numbers  $A = a_3a_2a_1a_0$  and  $B = b_3b_2b_1b_0$  and the subtraction of the same two numbers, i.e.,  $O=A-B$  when  $M=1$ .

The design of the 4-bit adder/subtractor module is covered in Chapter 4. It uses a 4-bit binary adder module and four exclusive OR gates as is seen below:



[See answer](#)

See more quest  
for subjects you s



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