Question: 2. (15 points) The Maclaurin series expansion of sin(x) is given by 3 sin)39 estimate the true va...

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

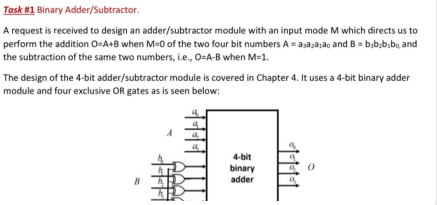
Was this answer helpful? 0 0

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…



See answer

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