Question: Write a MATLAB function that calculates the approximate valu...

Write a MATLAB function that calculates the approximate value of arctan(x) using the Maclaurin series approximation: arctan(x)=x-x^3/3+x^5/5-x^7/7+⋯ The function should accept 3 parameters: value of x, number of significant figures accuracy i.e. n, and the maximum number of iterations. In the function, use ε_s=(0.5×〖10〗^(2-n))% in order to continue until the ε_a falls below this criteria. The function should return 3 values: the approximate value of arctan(x) at the end of the program, final ε_a and the number of iterations it took.

Expert Answer

Anonymous answered this
8,465 answers

Was this answer helpful? 1 0

```
function [approx, final_e_a, num_iterations] = cal_arctan(x, n, max_iterations)
% Matlab function to calculate the approximate value of arctan(x) using the Maclaurin series approximation

% number of iterations
num_iterations = 1;
e_s = (0.5*(10^(2-n)))/100; % calculate the value of e_s for approximation

ptan = 0; % previous value of arctan
ctan = x; % current value of arctan

final_e_a = abs(ptan-ctan); % absolute difference between current and previous value of calculated arctan
sf = -1;

% loop continues till final_e_a >= e_s and number of
% iterations < maximum number of iterations
while(final_e_a >= e_s && num_iterations < max_iterations)
ptan = ctan; % set current value of arctan to previous value of arctan
% add the next term of series to current value of arctan
ctan = ctan + (sf *((x^(2*num_iterations+1))/(2*num_iterations+1)));

num_iterations = num_iterations+1; % increment the number of iterations
sf = -sf; % alternate the sign
final_e_a = abs(ptan-ctan); % absolute difference between current and previous value of calculated arctan
end

approx = ctan;
end
```

Output:

```
>> [approx, final_ea, numItr] = cal_arctan(pi/6,10,100)

approx =

    0.4823


final_ea =

   1.6160e-11


numItr =

    17
```

View comments (10) ›

Practice with similar questions

Q: Write a MATLAB function that calculates the approximate value of arctan(x) using the Maclaurin series approximation: arctan(x)=x-x^3/3+x^5/5-x^7/7+⋯ The function should accept 3 parameters: value of x, number of significant figures accuracy i.e. n, and the maximum number of iterations. In the function, use ε_s=(0.5× 〖10〗 ^(2-n))% in order to continue until the ε_a falls below this...

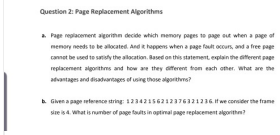
A: See answer

Up next for you in Computer Science

Task:1 List what all steps will be there to ensure the network is correctly patched? Elaborate each step-in detail. Also, list any 5 latest Patch Management Tools. Task:2 Write the

See answer

Question 2: Page Replacement Algorithms a. Page replacement algorithm decide which …


Question 2: Page Replacement Algorithms

a. Page replacement algorithm decide which memory pages to page out when a page of memory needs to be allocated. And it happens when a page fault occurs, and a free page cannot be used to satisfy the allocation. Based on this statement, explain the different page replacement algorithms and how are they different from each other. What are the advantages and disadvantages of using those algorithms?

b. Given a page reference string: 1 2 3 4 2 1 5 6 2 1 2 3 7 6 3 2 1 2 3 6. If we consider the frame size is 4. What is number of page faults in optimal page replacement algorithm?

See answer

See more questions for subjects you study

Questions viewed by other students

Q: Write a MATLAB function that calculates the approximate value of arctan(x) using the Maclaurin series approximation: The function should accept 3 parameters: value of x, number of significant figures accuracy i.e. n, and the maximum number of iterations. In the function, use εs-(0.5 X 102-n)% in order to continue until the ε falls below this criteria. The function should return...

A: See answer

Q: Write a MATLAB function that uses Bisection Method to iteratively estimate the positive real root of the equation ln(x4)=0.7 in the interval [xl, xu] until εa is less than εs. Note that x is in radians. The function should accept 3 parameters: initial xl, xu, and εs, and return these 5 parameters for each iteration: xl, xu, xr Sign{fxlf(xr)} and εa. (Hint: Function should return...

A: See answer

Show more