5. Finding Fourier coefficients exercise

For loops and Fourier coefficients (External resource) (1.0 / 1.0 points)

Plotting the first 100 terms of the Fourier series (External resource) (1.0 points possible)

Can someone point me to what I'm doing wrong with the expression for the jth Fourier term? FSterms(j,:) = (((2/(pi))* (1-(-1)^(j))/j).*sin(pi*j*t));
I've been at it for few days now and I can't seem to get it right

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1 response

Donat-K
24 days ago

I think I figured it out!!!!

Wonderful! That was fast. :)

posted 24 days ago by **jfrench** (Staff)

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```
% Create a vector of zeros to store our coefficients
b = zeros(1,100);

%Determine the range of values you much let k range over
for k= 1:100
    %For each index k define a function to integrate
    f = @(t) square(t).*sin(k*t);
    %Set the kth entry of b equal to the value of the Fourier coefficient
    b(k) = (1/pi)*integral(f, -pi, pi);
    % If b(k) is small, set to 0 since we want to discount nonzero numbers due to numerical error
    if b(k)<10^-5
        b(k) = 0;
    end
end

%Display bar graph of coefficients
bar(b);
```

Run Script

Previous Assessment: All Tests Passed

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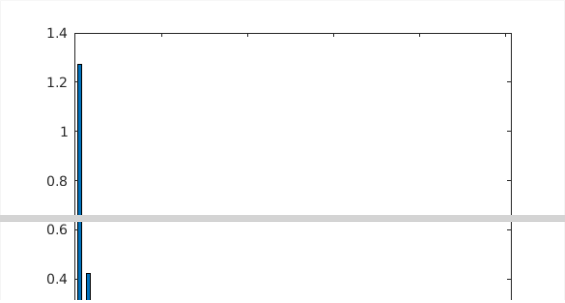
Correct coefficients in b

Output



```
%% COPY and PASTE the for loop you found from the problem above.
for k= 1:100
    %For each index k define a function to integrate
    f = @(t) square(t).*sin(k*t);
    %Set the kth entry of b equal to the value of the Fourier coefficient
    b(k) = (1/pi)*integral(f, -pi, pi);
    % If b(k) is small, set to 0 since we want to discount nonzero numbers due to numerical error
    if b(k)<10^-5
        b(k) = 0;
    end
end

%Compute superposition of truncated Fourier series
FSterms = zeros(100,N);

%First, multiply each coefficient by the appropriate sin function
for j=1:100
    if b(j) > 10^-5
        % Give an expression for the jth Fourier term
        FSterms(j,:) = b(j)*sin(j*t);
    end
end

%Take the sum of the first 100 terms
SqFS = sum(FSterms);

%Plot the Sq and the SqFS
plot(t,SqFS,'b'); hold on;
plot(t,Sq,'k');
```

Run Script

Assessment: All Tests Passed

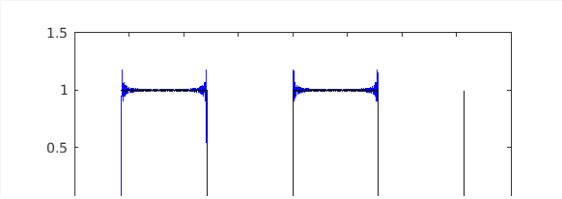
Submit

Check b

Check FSterms

Check SqFS

Output



Further exploration

To continue to explore the terms of the Fourier series, consider going to MATLAB online. See what you get when you plot the first 200 terms. The first 500 terms!

Alternatively, watch to see how the square wave develops by plotting the first term, the sum of the first two terms, the sum of the first three terms etc.

5. Finding Fourier coefficients exercise

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Struggling to find the right FSterms(j,:)

discussion posted 24 days ago by Donat-K