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% Fall 2018
% Name: Terry-Ann Sneed
% Lab # 7

clear all
close all

syms t k L n % Initialize symbolic variables

evalin(symengine,'assume(k,Type::Integer)');  % Let matlab know that
the variable k is an integer

a = @(f,t,k,L) int(f*cos(k*pi*t/L)/L,t,-L,L); % create kth cosine
coefficient a

b = @(f,t,k,L) int(f*sin(k*pi*t/L)/L,t,-L,L);   % create kth sine
coefficient b

fs = @(f,t,n,L) a(f,t,0,L)/2 + ...     symsum(a(f,t,k,L)*cos(k*pi*t/L)
+ b(f,t,k,L)*sin(k*pi*t/L),k,1,n);    % generate the nth partial sum

f = t;  % Original function

n = [2 10 20 50 100];

g = inline(vectorize(fs(f,t,2,1))); h =
inline(vectorize(f)); X = -1:.001:1;
rmse_1 = sqrt(sum((h(X)-g(X)).^2)/ n(1))

g = inline(vectorize(fs(f,t,10,1))); h =
inline(vectorize(f)); X = -1:.001:1;
rmse_2 = sqrt(sum((h(X)-g(X)).^2)/ n(2))

g = inline(vectorize(fs(f,t,20,1))); h =
inline(vectorize(f)); X = -1:.001:1;
rmse_3 = sqrt(sum((h(X)-g(X)).^2)/ n(3))

g = inline(vectorize(fs(f,t,50,1))); h =
inline(vectorize(f)); X = -1:.001:1;
rmse_4 = sqrt(sum((h(X)-g(X)).^2)/ n(4))

g = inline(vectorize(fs(f,t,100,1))); h
= inline(vectorize(f)); X = -1:.001:1;
rmse_5 = sqrt(sum((h(X)-g(X)).^2)/ n(5))

rmse_array = [rmse_1 rmse_2 rmse_3 rmse_4 rmse_5];

plot(rmse_array, n)
title("RMSE vs N")


rmse_1 =

8.9739
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rmse_2 =

1.9894


rmse_3 =

1.0193


rmse_4 =

0.4256


rmse_5 =

0.2258
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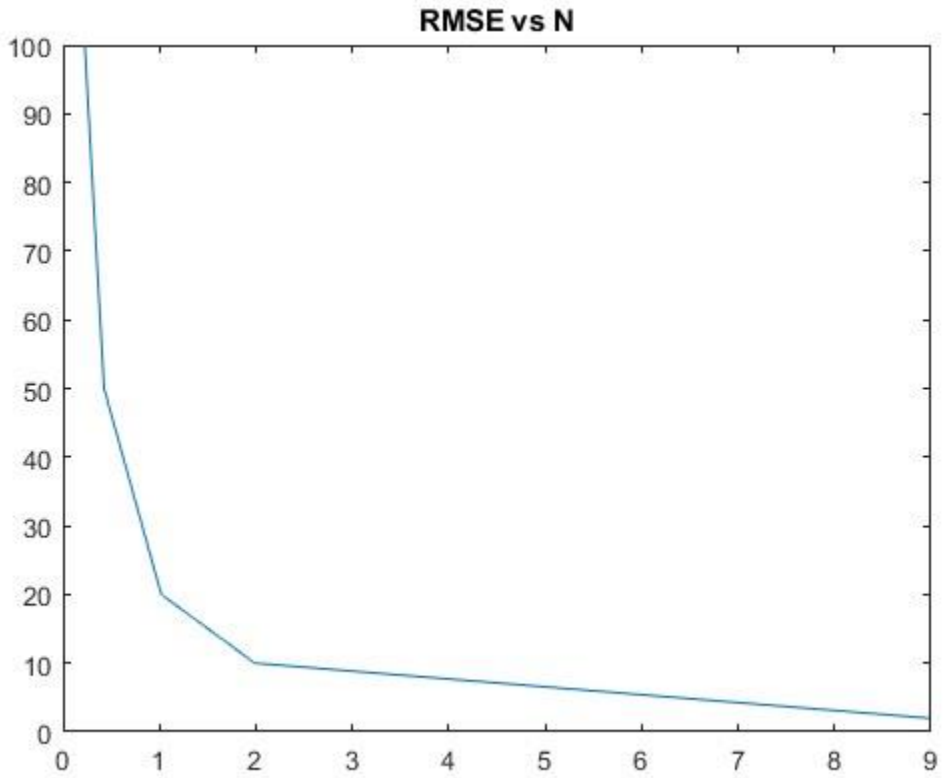

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