```matlab
 1 % Sounak Ghosh
 2 % 9/28/19
 3 % ECE 202 - Fall 2019 - MATLAB Exercise M5
 4 % equation source: https://www.math.utah.edu/~gupta/MATH1060Fall2012/FormulaSheet.↙
pdf
 5
 6 clear % clears all variables in the workplace; avoids common errors
 7 clc % clears all previous outputs in the command window
 8
 9 % f(t) = 12*cos(60t + 1.8)*cos(100t + 1.2)
10 % cos A cos B = 1/2 (cos(A + B) + cos(A ? B))
11
12 tms = linspace(0,200,400);        % 0 to 200ms, needed for plot
13 t = tms * 10^(-3);                % Converting time to milisecond
14 x = 60*t - 1.8;                   % first sinusoid expression in cos
15 y = 100*t + 1.2;                  % second sinusoid expression in cos
16 a = 12;                          % a is the constant
17 f1 = a*cos(x).*cos(y);           % the original sinusoid fnction
18 f2 = (a/2)*cos(x - y);           % function of the first sinusoid
19 f3 = (a/2)*cos(x + y);           % function of the second sinusoid
20
21 %---- checks ------------------
22
23 check1 = f2 + f3 - f1;                        % Check function for the array with↙
zeroes
24 plot(tms,f1,tms,f2,tms,f3,tms,check1,'--')    % plot f1, f2, f3 and check 1
25 ax = gca;
26 ax.FontSize = 18.5;
27 % legend showing the magnitude of each function
28 legend('f1 - 12*cos(x)*cos(y)', 'f2 - 6*cos(x-y)', 'f3 - 6*cos(x-y)','check1:f2 +↙
f3 - f1')
29 xlabel('time t (ms)')                         % x axis label
30 ylabel('f(t)')                                % y axis label
31 title('ECE 202, Exercise M5 - Plotting a Product of 2 Sinusoids as a Sum of 2↙
Sinusoids')
32 check2 = sum(abs(check1))
33
34 % The ABS(absolute function) is used to prevent the postive part cancel the
35 % the negative part. By using the ABS(absolute function) everything is
36 % becomes the same sign and reduces error points in the the plots. Instead
37 % of just adding the positive and the negative numbers which will anyway
38 % give zero, we add the positive points to just check the actual magnitude of
39 % the data. Hence, making our check more precise and solid.
40
```

```
1
2 check2 =
3
4    1.0018e-12
5
6 >>
```

ECE 202, Exercise M5 - Plotting a Product of 2 Sinusoids as a Sum of 2 Sinusoids

Legend:
- f1 - 12*cos(x)*cos(y)
- f2 - 6*cos(x-y)
- f3 - 6*cos(x-y)
- check1:f2 + f3 - f1

x-axis: time t (ms)
y-axis: f(t)