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% Abhilash Gudgunti
% 1 November, 2024
% Power series expansion of Acos(wt)

clear %clear registers
clf % clear figures
format shortG

% Defining arrays
n = 0:2:10; % values of n for the first 6 non-zero terms. (Increments of 2)
a_n = 12*((-1).^(n./2)).*40.^(n) ./ factorial(n) % Array of values of a_n

% setting up array of time
t = linspace(0,0.2,1000); % time between 0 - 0.2s

%Defining Functions

f1 = a_n(1) * t.^n(1); % The first non zero term
f2 = f1 + a_n(2) * t.^n(2); % The second non zero term
f3 = f2 + a_n(3) * t.^n(3); % The third non zero term
f4 = f3 + a_n(4) * t.^n(4); % The fourth non zero term
f5 = f4 + a_n(5) * t.^n(5); % The fifth non-zero term
f6 = f5 + a_n(6) * t.^n(6); % The sixth non zero term

%Plotting the functions
plot(t, f1, t, f2, t, f3, t, f4, t, f5, t, f6)

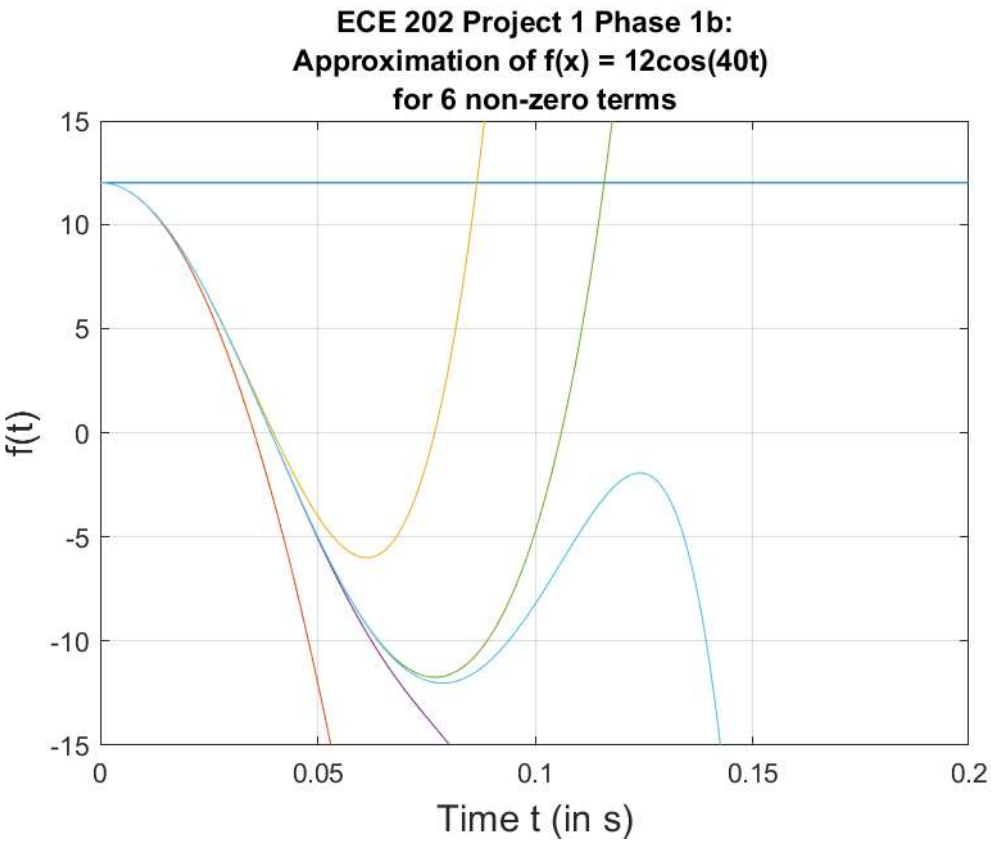
% Figure components
title(sprintf(['ECE 202 Project 1 Phase 1b:\nApproximation of ' ...
    'f(x) = 12cos(40t) \nfor 6 non-zero terms']))
xlabel('Time t (in s)', 'FontSize', 14)
ylabel('f(t)', 'FontSize', 14)
ylim([-15, 15])
xlim([0,0.2])
grid on
```

```
>> ECE202_P1_Phase1_b

a_n =

          12        -9600     1.28e+06  -6.8267e+07   1.9505e+09  -3.4675e+10

>>
```


ECE 202 Project 1 Phase 1b:
Approximation of f(x) = 12cos(40t)
for 6 non-zero terms
15
10
5
0
-5
-10
-15
f(t)
0
0.05
0.1
0.15
0.2
Time t (in s)