ECE 202-Project 1 -Phase 1

n	$f^n(t)$	$f^n(0)$
0	$12\cos(40t)$	12
1	$-12(40)\sin(40t)$	0
2	$-12(40^2)\cos(40t)$	$-12(40)^2$
3	$12(40^3)\sin(40t)$	0
4	$+12(40^4)\cos(40t)$	$12 \cdot (40^4)$
5	$-12(40^5)\sin(40t)$	0
6	$-12(40^6)\cos(40t)$	$-12 \cdot (40^6)$

$$a_n = \frac{12(-1)^{n/2} \cdot 40^n}{n!} \quad , \quad \because a_n = \frac{f^n(0)}{n!}$$

```matlab
 1 % Kavya Manchanda
 2 % 11/1/2022
 3 % ECE 202: Project 1 Phase 1 — Power Expansion Series
 4 % Expressing 12cos(40t) as the sum of an infinite power series aka Taylor
 5 % series
 6
 7 clear; clf;
 8 format shortG;
 9
10 tmin = 0;
11 tmax = 0.2; % in s
12 N = 5;      % intervals
13
14 t = linspace(tmin, tmax, 401);  % time in s
15
16 n = 0:2:10;  % number of terms
17
18 % The angular frequency in rad/s
19 an = (12.*(-1).^(n./2).*40.^n)./factorial(n)
20
21 f1 = an(1)*t.^n(1);       % first sum (ie. first term) in the power series
22 f2 = f1 + an(2)*t.^n(2); % sum of first two terms
23 f3 = f2 + an(3)*t.^n(3); % sum of first three terms
24 f4 = f3 + an(4)*t.^n(4); % sum of first four terms
25 f5 = f4 + an(5)*t.^n(5); % sum of first five terms
26 f6 = f5 + an(6)*t.^n(6); % sum of first six terms
27
28 plot(t,f1,t,f2,t,f3,t,f4,t,f5,t,f6,'LineWidth',1.6)
29 xlabel('time t (ms)');
30 ylabel('f(t)')
31 ylim([-15,15])
32 title("ECE 202 Project 1 Phase 1")
33 subtitle("Plotting the first 6 non-zero terms of the functon 12cos(40t) " + ...
34     "as a truncated Power Taylor Series")
35 grid on
36
```

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>> untitlednov2

an =

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

>>
```

ECE 202 Project 1 Phase 1
Plotting the first 6 non-zero terms of the functon 12cos(40t) as a truncated Power Taylor Series