MA222-06 Worksheet #7
Let $f(t) = t^2$ for $0 \leq t \leq 4$.

1 Construct the even periodic extension of $f(t)$, $E(t)$. Sketch the graph of $E(t)$. Be sure to label important values.

2 Determine the Fourier Series expansion of $E(t)$. This is known as the Fourier Cosine series for $f(t)$.
3 Construct the odd periodic extension of $f(t)$, $A(t)$. Sketch the graph of $A(t)$. Be sure to label important values.

4 Determine the Fourier Series expansion of $A(t)$. This is known as the Fourier Sine series for $f(t)$.
5 Plot the graph of the (infinite) Fourier Cosine Series of $f(t)$. Be sure to label important values.

6 Plot the graph of the (infinite) Fourier Sine Series of $f(t)$. Be sure to label important values.

7 A mass of 2 pounds is attached to a spring with a spring constant of 10 and damping constant of 4. The system satisfies $x(0) = 0, x(\pi/\omega) = 0$. The forcing function $f(t) = \sin(\omega t)$ is applied. Determine the position of the mass, $x(t)$, as a function of time.

8 A mass of 2 pounds is attached to a spring with a spring constant of 10 and damping constant of 4. The system satisfies $x(0) = 0, x(4) = 0$. The forcing function $f(t) = t^2$ for $0 \leq t \leq 4$ is applied. Use an appropriate Fourier Series to determine the solution to the endpoint value problem.