1. Convert the following system into a system of first order differential equations. Do not attempt to solve.

$$3x_1'' - 2x_1' + 5x_1 + 2x_2'' + x_2 = 0$$
$$x_2^{(3)} + x_1 + x_2' = 0$$

2. Find the general solution to the following.

(a) $\mathbf{x}' = \begin{bmatrix} 3 & -1 \\ 1 & 1 \end{bmatrix}$

(b) $\mathbf{x}' = \begin{bmatrix} -4 & -9 & 3 \\ 0 & -1 & 0 \\ -6 & -18 & 5 \end{bmatrix} \mathbf{x}$

3. Find the Fourier series for $f(x) = x^2/2$ for $-2 \leq x \leq 2$ and $f(x+4) = f(x)$.