Assignment Sheet - 2

1. Find the complex Fourier series of \( f(x) = e^{-2x} \) in \((0, 1)\).

2. Find the sum of the series \( \sum_{n=1}^{\infty} \frac{1}{(2n-1)^2} \) by writing the Fourier cosine series of \( f(x) = \begin{cases} 1, & 0 < x < 1 \\ 2, & 1 < x < 2 \end{cases} \).

3. Find the sum of the series \( \sum_{n=1}^{\infty} \frac{1}{n^2} \) by writing the Fourier sine series of \( f(x) = \frac{\pi}{2} - x \) in \((0, \pi)\).

4. Find the complex Fourier transform of \( f(x) = 1 + x|\sin x|, x \in [-1,1] \).

5. Expand \( f(x) = \sin x, 0 \leq x \leq \pi \) in terms of \( e^{i2nx}, n \in \mathbb{Z} \).