CG2023 ASSIGNMENT 4 (ESD and PSD)

1. For the rectangle signal $x(t)$ given below in time domain, determine its

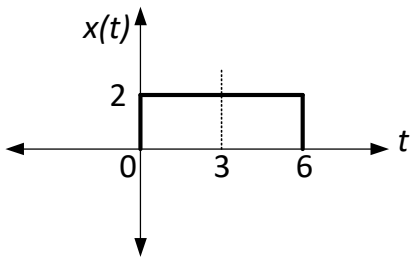

Figure 4.1

   a) Energy spectral density (ESD), $E_x(f)$.
   b) Total energy, E.
   c) 1st-null bandwidth.

2. For the triangular spectrum of a signal $X(f)$ given below, determine its

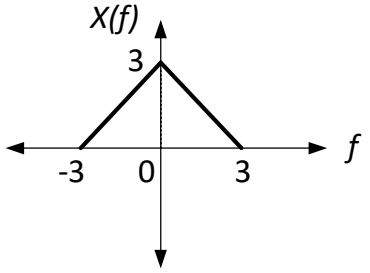

Figure 4.2

   a) Energy spectral density (ESD), $E_x(f)$.
   b) Total energy, E.
   c) $3dB$ bandwidth.

3. Find the total energy of the signals described below.
   a) $X(f) = sinc(f)$
   b) $y(t) = sinc(t)$

4. If a periodic signal $q(t) = \sum_{n=-\infty}^{\infty} x(t - 12n)$ is obtained by repeating the rectangle signal $x(t)$ in Fig.1, determine its
   a) Power spectral density (PSD), $P_q(f)$.
   b) Average power, P.

5. Given a signal $v(t) = 2 + (3+j)e^{j4\pi t} + 4e^{j8\pi t} + 5\, e^{j(10\pi t + \frac{\pi}{4})}$, determine
   a) Power spectral density, $P_v(f)$
   b) Average power, P

End