

EE3700 : Communications I

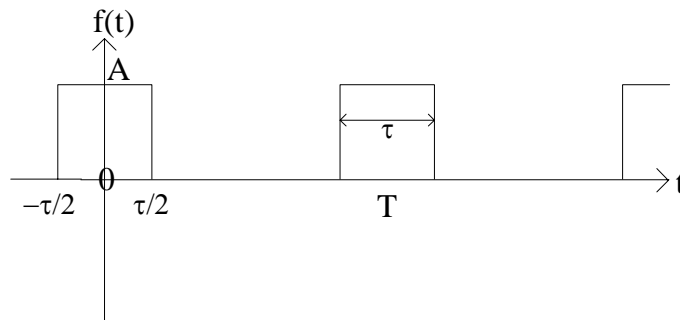
Tutorial 1

1. A certain periodic band-limited signal consists of frequencies at dc, 500Hz and at 1kHz. The signal can be written as

$$s(t) = 12 + 20 \cos 1000\pi t - 20 \sin 1000\pi t + 12 \cos 2000\pi t - 6 \sin 2000\pi t$$

Express this signal as a Fourier series in complex exponential form.

2. Determine the Fourier coefficients C_n for the following periodic signal.



3. Considering the waveform in question 2, estimate the amount of the original signals power which would pass through a filter that rejects harmonics above 2nd order (ie greater than $2 \times f_0 = 2/T$). Assume $T=1\text{mS}$, $A = 10$ volts and $\tau = 0.25\text{mS}$.
4. A radar system transmits pulses of 200nS duration. Estimate the bandwidth of the transmitter circuitry necessary to ensure that at least 90% of the energy of the pulse is transmitted.