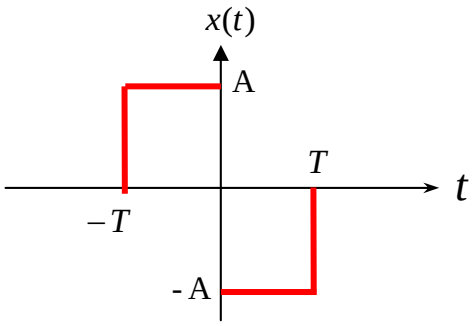
Question 1

a) For the doublet pulse given below



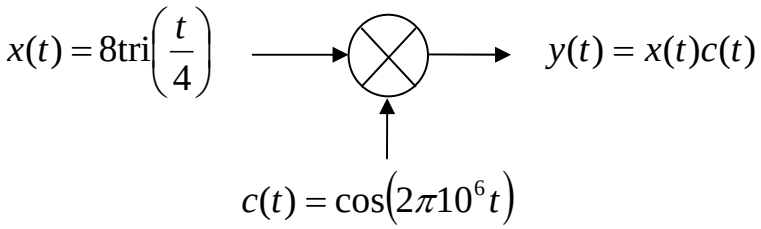
(i) Show that the Fourier transform is given as **[3 marks]**

$$X(f) \leftrightarrow 2jAT\text{sinc}(Tf)\sin(\pi Tf)$$

(ii) Based on the result in (i) show that the Fourier Transform of a triangular pulse is given as **[3 marks]**

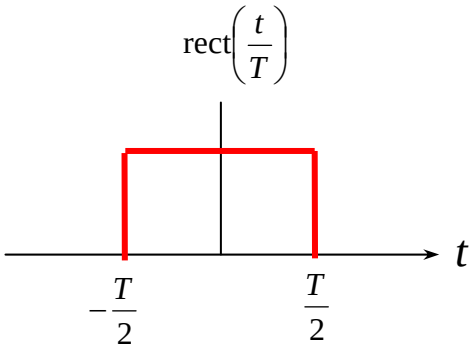
$$\text{tri}\left(\frac{t}{T}\right) \leftrightarrow T\text{sinc}^2(Tf)$$

b) For the following system



Find the expression for the Fourier transform of the output signal $y(t)$. **[5 marks]**

c) For a rectangular pulse given below



Show that the Fourier transform is given as **[4 marks]**

$$\text{rect}\left(\frac{t}{T}\right) \leftrightarrow T\text{sinc}(Tf)$$

d) For the following signal in time domain

$$g(t) = \text{rect}\left(\frac{t}{16}\right)\text{rect}\left(\frac{t-4}{8}\right)$$

(i) Plot $g(t)$. **[4 marks]**

(i) Find the expression for the Fourier transform of $g(t)$ **[6 marks]**