Task 3.5

Let a discrete stationary random process x (ζ, t).
The outcomes of the process are the values $x_1 = -1, x_2 = 0 \ and \ x_3 = 1$
The probabilities of the occurrence of those outcomes are

$$P(\{x(\zeta, t+\tau) = x_i\} | \{x(\zeta, t) = x_j\}) = \begin{cases} \frac{1}{3}\left(1 + 2\, e^{-|\tau|}\right) & for\ i = j \\ \frac{1}{3}\left(1 - e^{-|\tau|}\right) & for\ i \neq j \end{cases} \qquad i, j = 1,2,3$$

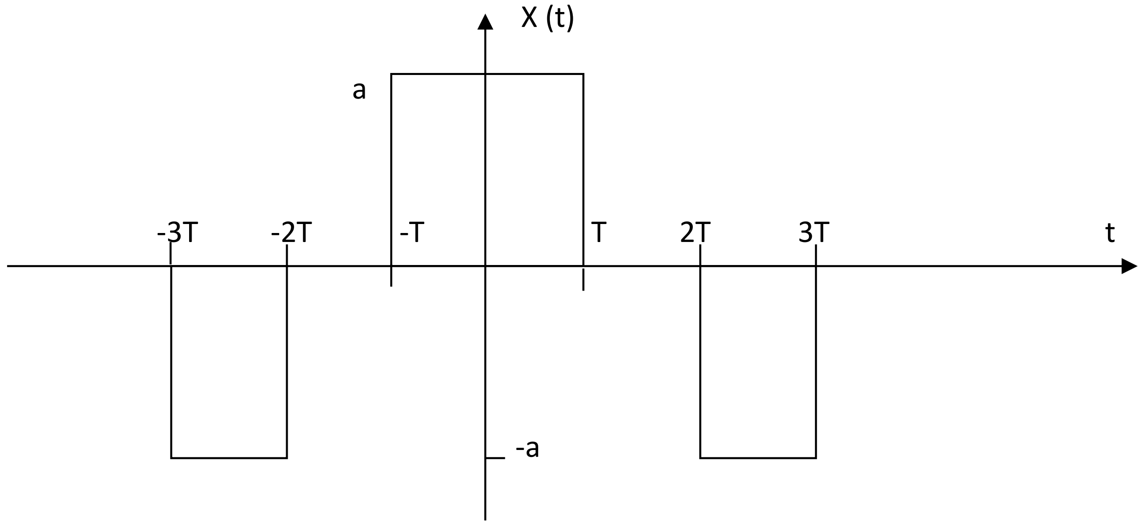
a) Calculate the probabilities

$$P(\{x(\zeta, t) = x_i\}) \quad for\ i = 1,2,3.$$

b) Calculate the ACF $s_{xx}(\tau)$

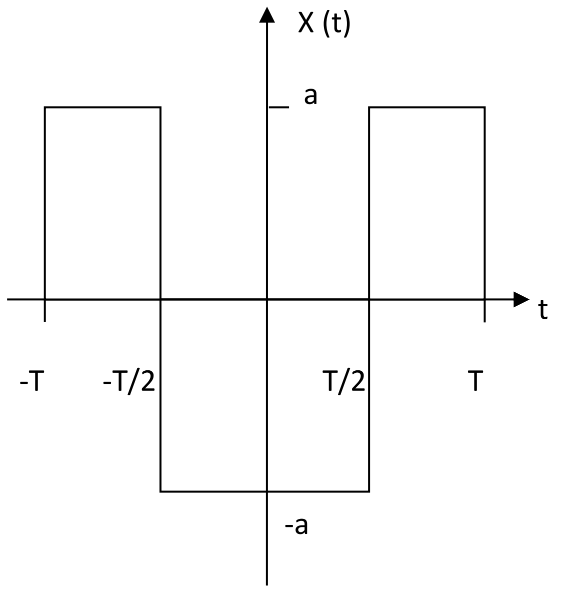
Task 3.6

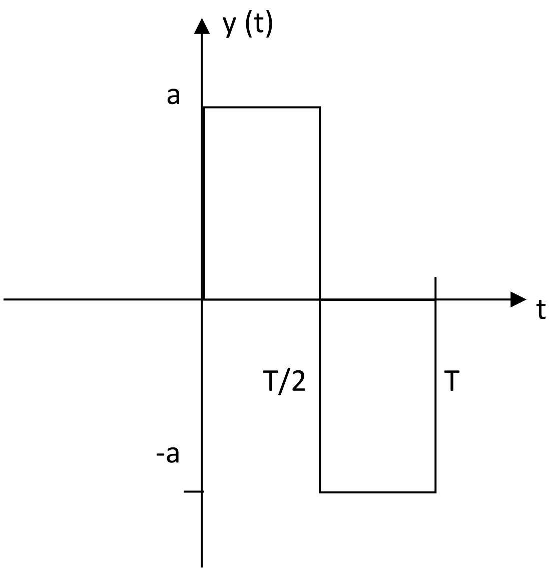
a) Given is the following signal x (t):



Sketch the autocorrelation function $\tilde{s}_{xx}(\tau)$.

b) Let two deterministic signals x (t) and y (t) of finite energy.





Sketch the cross-correlation function $\tilde{s}_{xy}(\tau)$.