Stochastic processes

1. Let W be an exponential random variable with probability density function

$$\varphi_W(w) = \begin{cases} e^{-w}, & w \geq 0 \\ 0, & otherwise \end{cases}.$$

   (a) Find the cumulative distribution function F_{X_t} of the time delayed ramp process $X_t = t - W$.

   (b) Find the autocovariance function of a process X_t.

2. Consider two independent random variable, X and Y, where $X : \mathcal{E}(1)$ and

$$\varphi_{(X,Y)}(x, y) = \begin{cases} \frac{1}{2}e^{-x}, & x \geq 0,\ y \in (1, 3), \\ 0, & otherwise. \end{cases}$$

   Find autocovariance function of a stochastic process $N_t = X(tX + Y)$.