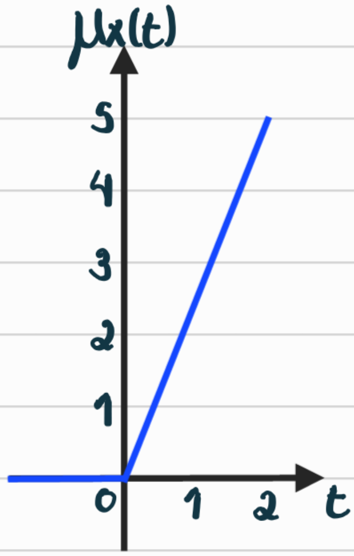
Laucas Coelho Raupp

3) a) $\mu_x(t) = \lambda t[t \geq 0]$ $\lambda = \lambda_1 + \lambda_2$

$\lambda = 1{,}5 + 1$ $\lambda = 2{,}5$ eventos/s

$\mu_x(t) = 2{,}5t[t \geq 0]$



b) $Pr[X_{4,5} \geq 3 / X_{2,3} = 2] = Pr[X_{4,5} \geq 3]$ $X_{4,5} \sim \text{Poisson}(2{,}5(5-4))$

$p_x(x) = e^{-\mu} \cdot \dfrac{\mu^x}{x!}$ $Pr[X_{4,5} \geq 3] = 1 - e^{-2,5}\left(\dfrac{2{,}5^0}{0!} + \dfrac{2{,}5^1}{1!} + \dfrac{2{,}5^2}{2!}\right)$

$Pr[X_{4,5} \geq 3] = 0{,}456187$

c) $\Delta_6 = T_6 - T_5$ $\Delta_n = e^{\lambda}$ $Pr[\Delta_6 > 1] = \int_1^{\infty} 2{,}5e^{-2,5x}dx = -e^{-2,5x}\Big|_1^{\infty} = -e^{-2,5\cdot\infty} + e^{-2,5\cdot 1}$

$Pr[\Delta_6 > 1] = 0 + e^{-2,5}$ $Pr[\Delta_6 > 1] = 0{,}082085$

d) $\vec{X} = [X(4) \;\; X(7)]^T$

$$C_{\vec{X}} = \begin{bmatrix} cov(X(4),X(4)) & cov(X(4),X(7)) \\ cov(X(7),X(4)) & cov(X(7),X(7)) \end{bmatrix}$$

$cov(t_1,t_2) = \lambda \cdot min(t_1,t_2) [t_1,t_2 \geq 0]$

$cov(X(4),X(4)) = 2{,}5 \cdot (4) = 10$ $\quad cov(X(4),X(7)) = cov(X(7),X(4)) = 2{,}5 \cdot 4 = 10$

$cov(X(7),X(7)) = 2{,}5 \cdot (7) = 17{,}5$

$$C_{\vec{X}} = \begin{bmatrix} 10 & 10 \\ 10 & 17{,}5 \end{bmatrix} //$$