Es 1

1) $P[t_1 < t_2] = \int_{-\infty}^{+\infty} P[t_1 < t_2 | t_1 = a] f_{t_1}(a) da$

$= \int_0^{+\infty} P[t_2 > a | t_1 = a] \lambda e^{-\lambda a} da$

$= \int_0^{+\infty} e^{-\mu a} \lambda e^{-\lambda a} da = \frac{\lambda}{\mu + \lambda}$

2) $y = \min\{t_1 t_2\}$ $a \geq 0$

$P[\min\{t_1 t_2\} \leq a] = 1 - P[t_1 > a, t_2 > a]$

$= 1 - e^{-\mu a} e^{-\lambda a}$ $\Rightarrow y \in \mathcal{E}(\mu + \lambda)$

$m_y = \frac{1}{\mu + \lambda}$

3) $z = \max\{t_1 t_2\}$ $a \geq 0$

$F_z(a) = P[z \leq a] = P[t_1 < a, t_2 < a] = (1 - e^{-\mu a})(1 - e^{-\lambda a})$

$= 1 - e^{-\mu a} - e^{-\lambda a} + e^{-(\lambda + \mu) a}$

$f_z(a) = \mu e^{-\mu a} + \lambda e^{-\lambda a} - (\lambda + \mu) e^{-(\lambda + \mu) a}$ $a \geq 0$

$m_z = \frac{1}{\mu} + \frac{1}{\lambda} - \frac{1}{\lambda + \mu}$

Es. 2

1) $\begin{cases} \lambda_1 = \lambda + 0.2\lambda_2 \\ \lambda_2 = \lambda_1 + 0.2\lambda_2 \end{cases} \Rightarrow \begin{array}{l} \lambda_1 = \frac{4}{3}\lambda \\ \lambda_2 = \frac{5}{3}\lambda \end{array}$

$$\left.\begin{array}{l} p_1(k) = 2p_0 \left(\frac{\lambda_1}{2\mu}\right)^k \\ p_1(0) = p_0 = \dfrac{2\mu - \lambda_1}{2\mu + \lambda_1} \end{array}\right\} *$$

$$m_{S_1} = \frac{1}{\mu} + \frac{2\mu\, p_1(2)}{(2\mu - \lambda_1)}$$

2) $P = P[x_1(t) = 2 \mid x_2(t) = 5]$

$$= \frac{P[x_1(t) = 2,\, x_2(t) = 5]}{P[x_2(t) = 5]} = \frac{P_{12}(2,5)}{P_2(5)}$$

$$= \frac{p_1(2)\, p_2(5)}{p_2(5)} = p_1(2) \qquad (\text{vedi } *)$$

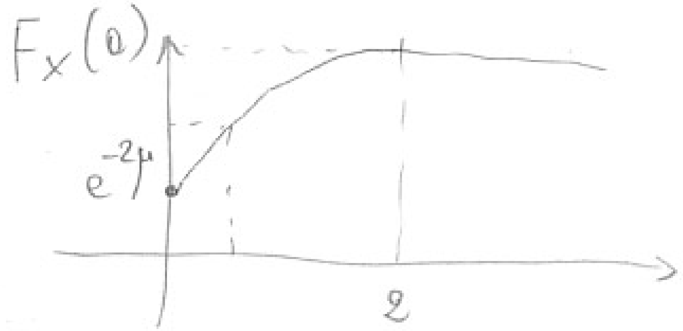
3) $m_S = \dfrac{m_X}{\lambda}$

$m_X = m_{X_1} + m_{X_2}$

$m_{X_1} = \lambda_1 \cdot m_{S_1}$ (vedi domanda 1))

$m_{X_2} = \dfrac{\lambda_2}{\mu - \lambda_2}$

Es 3



$u = 1 - e^{-\mu y} + e^{-2\mu}$

$y = -\frac{1}{\mu} \ln\left(1 - u + e^{-2\mu}\right)$

u = rand;

if $u \le e^{-2\mu}$

$y = 0$

else

$y = -\frac{1}{\mu} \ln\left(1 - u + e^{-2\mu}\right)$