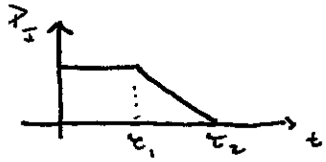
MATH 6350 h - generalrecovery.pdf.

$$P_I(t) = \begin{cases} 1 & 0 \le t < \tau_1 \\ \dfrac{\tau_2 - t}{\tau_2 - \tau_1} & \tau_1 \le t < \tau_2 \\ 0 & \tau_2 \le t \end{cases}$$



Probability of being infectious is 1 until τ_1, then decreases linearly to 0 at τ_2.
Thus, everyone is infectious until τ_1 but everyone does not recover immediately and at the same time.

$$\tau \equiv \int_0^\infty P_I(r)\,dr = \int_0^{\tau_1} 1 \cdot dt + \int_{\tau_1}^{\tau_2} \frac{\tau_2 - r}{\tau_2 - \tau_1}\,dr + \int_{\tau_2}^\infty 0 \cdot dr$$

$$= \underbrace{\tfrac{1}{2}(\tau_2 + \tau_1)}_{\text{average of } \tau_1 \,\&\, \tau_2}$$

$$I(t) = \int_{-\infty}^{t} \beta\,[1 - I(r)]\,I(r)\,P_I(t-r)\,dr \qquad \text{from notes.}$$

Steady states satisfy

$$I_s = \beta(1 - I_s)\,I_s \underbrace{\int_0^\infty P_I(r)\,dr}_{\tau}$$

$$\Rightarrow I_s = 0 \qquad I_s = 1 - \frac{1}{\beta\tau}$$

Char. Equation. from class notes.

$$1 = \beta(1 - 2I_s)\int_0^\infty P_I(r)\,e^{-\lambda r}\,dr$$

$$\frac{1}{\beta(1-2I_s)} = \underbrace{\int_0^{\tau_1} 1 \cdot e^{-\lambda r}\,dr + \int_{\tau_1}^{\tau_2} \frac{\tau_2 - r}{\tau_2 - \tau_1}\,e^{-\lambda r}\,dr}_{\text{Ugly function of } \lambda,\ \tau_1 \,\&\, \tau_2} + \int_0^\infty 0\,e^{-\lambda r}$$

$$\frac{1}{\beta(1-2I_s)} = f(\lambda, \tau_1, \tau_2)$$