(a)

$$\text{mRNA} \Rightarrow \dot{m}_i = r_{x,i} u_i - (\mu + \theta_{m,i}) m_i + \lambda_i \quad i = 1, 2, \ldots, N$$

$$\text{Protein} \Rightarrow \dot{p}_i = r_{L,i} w_i - (\mu + \theta_{p,i}) p_i$$

$\mathcal{B} = V_L$ abstract volume basis

$V_L = 15\mu L$ working volume (constant)

There are no cells because we are in a cell free system, so there is no μ term (no growth), also there's only one species (deGFP)

$$\therefore \dot{m} = r_x u - \theta_m m + \lambda \quad (1)$$

$$\dot{p} = r_L w - \theta_p p \quad (2)$$