1.Using the law of mass action, we can derive the four equations for the rate of changes of the
four species, E, S, ES, and P:

$$\begin{cases} \dfrac{dC(ES)}{dt} = k_1C(E)C(S) - k_3C(ES) - k_2C(ES) \\ \dfrac{dC(P)}{dt} = k_3C(ES) \\ \dfrac{dC(S)}{dt} = k_2C(ES) - k_1C(E)C(S) \\ \dfrac{dC(E)}{dt} = k_2C(ES) + k_3C(ES) - k_1C(E)C(S) \end{cases}$$

$(C(*)\ refers\ to\ the\ concentration\ of\ (*))$