2.1

$$\frac{dC_E}{dt} = k_2 C_{ES} + k_3 C_{ES} - k_1 C_E C_S$$

$$\frac{dC_S}{dt} = k_2 C_{ES} - k_1 C_E C_S$$

$$\frac{dC_{ES}}{dt} = k_1 C_E C_S - k_2 C_{ES} - k_3 C_{ES}$$

$$\frac{dC_P}{dt} = k_3 C_{ES}$$


2.2

$$\frac{dC_E}{dt} = 750 C_{ES} - 100 C_E C_S$$

$$\frac{dC_S}{dt} = 600 C_{ES} - 100 C_E C_S$$

$$\frac{dC_{ES}}{dt} = 100 C_E C_S - 750 C_{ES}$$

$$\frac{dC_P}{dt} = 150 C_{ES}$$

using RK-4 method,


Formula:
- $y_{i+1} = y_i + \frac{1}{6}(k_1 + 2k_2 + 2k_3 + k_4)h$

Where
- $k_1 = f(x_i, y_i)$
- $k_2 = f\left(x_i + \frac{1}{2}h, y_i + \frac{1}{2}k_1 h\right)$
- $k_3 = f(x_i + \frac{1}{2}h, y_i + \frac{1}{2}k_2 h)$
- $k_4 = f(x_i + h, y_i + k_3 h)$

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