8.1. $\frac{d[E]}{dt} = -r_1 + r_2 + r_3$

$\frac{d[S]}{dt} = -r_1 + r_2$

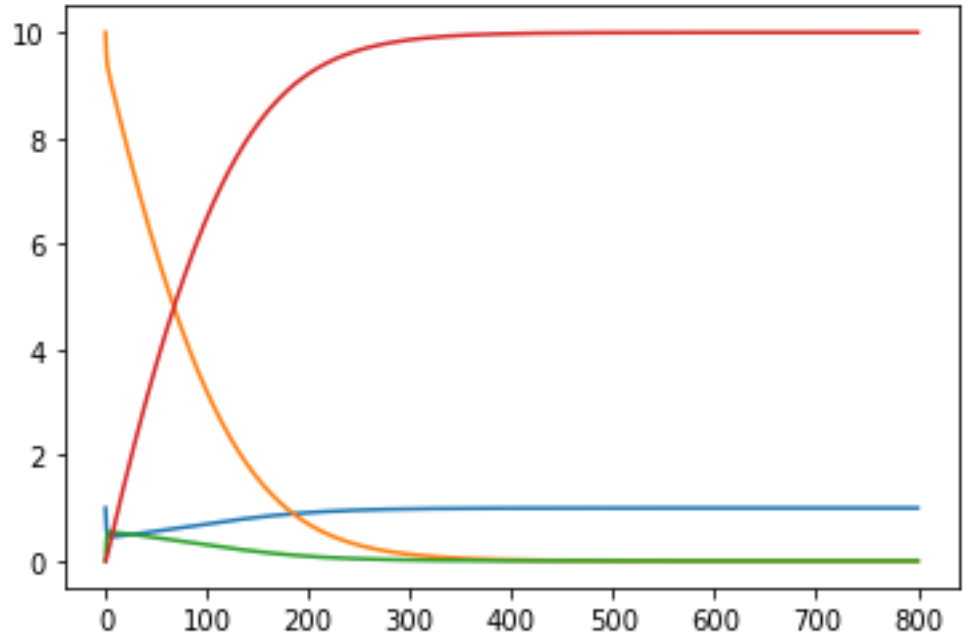
$\frac{d[ES]}{dt} = r_1 - r_2 - r_3$

$\frac{d[P]}{dt} = r_3$

$$\begin{cases} r_1 = k_1[E][S] \\ r_2 = k_2[ES] \\ r_3 = k_3[ES] \end{cases}$$

$$\begin{cases} \frac{d[E]}{dt} = -k_1[E][S] + [ES](k_2+k_3) \\ \frac{d[S]}{dt} = -k_1[E][S] + k_2[ES] \\ \frac{d[ES]}{dt} = k_1[E][S] - [ES](k_2+k_3) \\ \frac{d[P]}{dt} = k_3[ES] \end{cases}$$

8.2



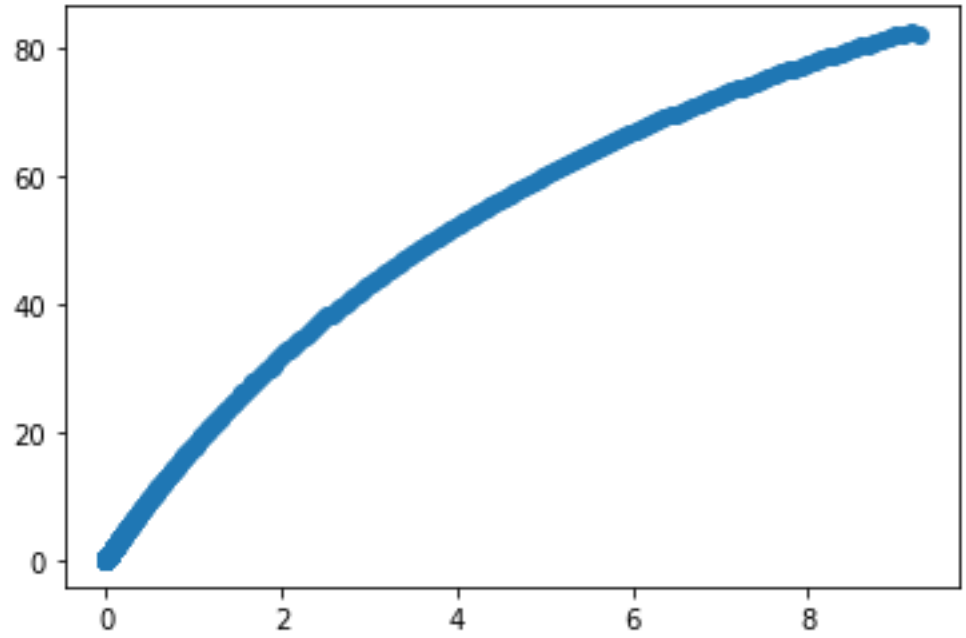
Red: Product;

Yellow: Substrate;

Blue: Enzyme;

Green: Enzyme-Substrate Complex.

8.3



Vm = 80