8.1

Four equations for the rate of change of the four materials:

$$\frac{dE}{dt} = -k_1[E][S] + k_2[ES] + k_3[ES]$$

$$\frac{dES}{dt} = k_1[E][S] - k_2[ES] - k_3[ES]$$
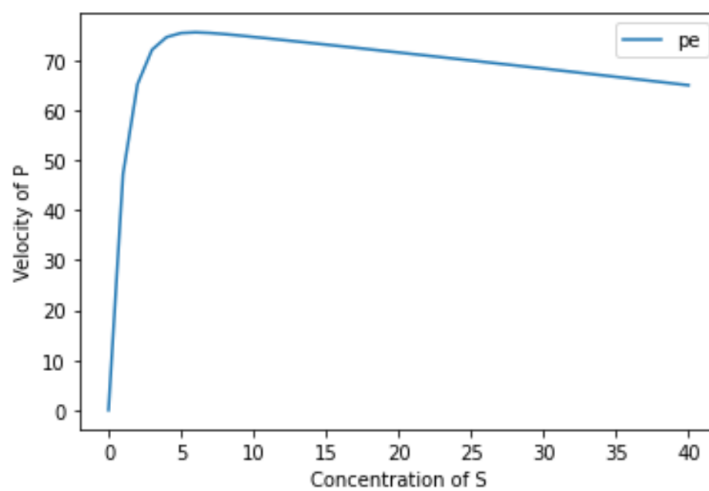
$$\frac{dS}{dt} = -k_1[E][S] + k_2[ES]$$

$$\frac{dP}{dt} = k_3[ES]$$

8.2

The code is in the "question_8.2 and 8.3"

8.3

We can see that, when the concentrations of S are small, the velocity V increases approximately linearly. But, when the concentrations of S are large, the velocity V saturates to a maximum value.
The maximum velocity is 75.51.

```
In [8]: max(150*x[:, 1])

Out[8]: 75.51375542356173
```