8.1

According to the law of mass action,

We make $[E]$ the concentration currently for E, $[S]$ the concentration for S, $[ES]$ the current concentration for ES and $[P]$ the current concentration for P.

The rate of change for E is:

$\frac{d[E]}{dt} = k2 * [ES] + k3 * [ES] - k1 * [E][S]$

The rate of change for S is:

$\frac{d[S]}{dt} = k2 * [ES] - k1 * [E][S]$

The rate of change for ES is:

$\frac{d[ES]}{dt} = k1 * [E][S] - k2 * [ES] - k3 * [ES]$

The rate of change for P is:

$\frac{d[P]}{dt} = k3 * [ES]$

8.2