Question 8

8.1) Using the law of mass action,

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

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

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

$$\frac{d[P]}{dt} = k_3[ES]$$

8.2) Given the rate constants,

$$\frac{d[E]}{dt} = -100[E][S] + 750[ES]$$

$$\frac{d[S]}{dt} = -100[E][S] + 600[ES]$$

$$\frac{d[ES]}{dt} = 100[E][S] - 750[ES]$$

$$\frac{d[P]}{dt} = 150[ES]$$