Positive feed-forward loop

The synthesis of protein R is activated by two catalysts: S and X. The degradation of R is not catalyzed. S activates the synthesis of X, while X decays freely.

1. Draw the network diagram for this process.

2. Write down the equations for the rate of change of the concentrations of R and X.

3. Assume that X is in steady state. How does the rate of synthesis and decay of R depend on the concentration of R and S?

4. Find the steady state concentration of R. How does this differ from the case when only S catalyzes R synthesis?