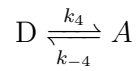
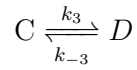
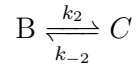
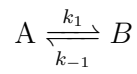


1. Consider the thermodynamic cycle



If this system is able to reach equilibrium, what conditions must the rate constants obey?

2. Show that the sensitivity of the Hill function, defined as

$$\text{sensitivity} = \frac{d \log y}{d \log x} = \frac{x}{y} \cdot \frac{dy}{dx}$$

is equal to the Hill number n divided by two when $x = K$, with K being the EC_{50} . Thinking about how the sensitivity relates a small change in x , Δx , to a small change in y , Δy ,

$$\frac{\Delta y}{y} = \text{sensitivity} \times \frac{\Delta x}{x}$$

why are Hill functions with a higher n steeper at $x = K$?