

# Chemistry 4010 interlude: The Lotka-Volterra model

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October 14, 2019

# The Lotka-Volterra model

- The classic “rabbits-and-foxes” model
- Rabbits reproduce:  $R \xrightarrow{k_r} (a+1)R$
- Foxes eat rabbits, enabling them to reproduce:  $R + F \xrightarrow{k_e} (b+1)F$
- Foxes die:  $F \xrightarrow{k_d} \rightarrow$

# Rate equations

$$\begin{aligned}\frac{dR}{dt} &= (ak_r)R - k_eRF = a'R - k_eRF \\ \frac{dF}{dt} &= (bk_e)RF - k_dF = b'RF - k_dF\end{aligned}$$