[nex28] **Master equation for a continuous random variable.**

Derive the master equation

$$\frac{\partial}{\partial t} P(x,t) = \int dx' [W(x|x')P(x',t) - W(x'|x)P(x,t)]$$

for the probability density $P(x,t)$ from

$$P(x,t+\Delta t|x',t) = \Delta t W(x|x') + \delta(x-x')[1-\Delta t \int dx'' W(x''|x')],$$

which expresses the conditional probability density in terms of time-independent jump rates. In this expression, the first term represents the probability density for transitions $x' \to x \neq x'$ within the time interval Δt and the second term the probability density for no transitions occurring within the time interval Δt.