Lecture FYS5429, May 7, 2024

FYS5429/9429 MAY 7, 2024

Basic Mathematics of Markov chains

$$p(x) = \int \underbrace{T(x, x'; \beta)}_{\text{transition probability}} p(x')$$

$p(x')$: original

$$p_i = \sum_j T_{ij} p_j \qquad (T_{ij} = T(j \to i))$$

$\downarrow$

stochastic matrix

$$\sum_j T_{ij} = 1 \quad \wedge \quad \sum_j p_j = 1$$

$P_i = P_i(t)$

$\Rightarrow$ specific state

$T_{ij}(t - t')$

$$P_i(t) = \sum_j T_{ij} P_j(t')$$

$t' = t_0$ $\qquad P_j(t_0)$

$$P_i(t_1) = \sum_j T_{ij} P_j(t_0)$$

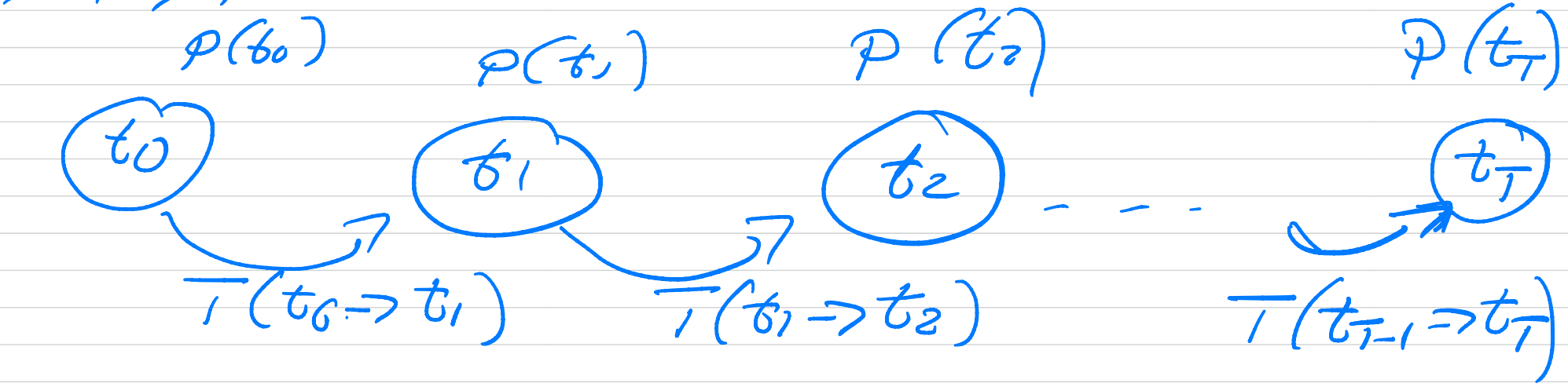
$$P(t) = \begin{bmatrix} P_0(t) \\ P_1(t) \\ \vdots \\ P_{M-1}(t) \end{bmatrix}$$

$$p(t) = T\, p(t')$$

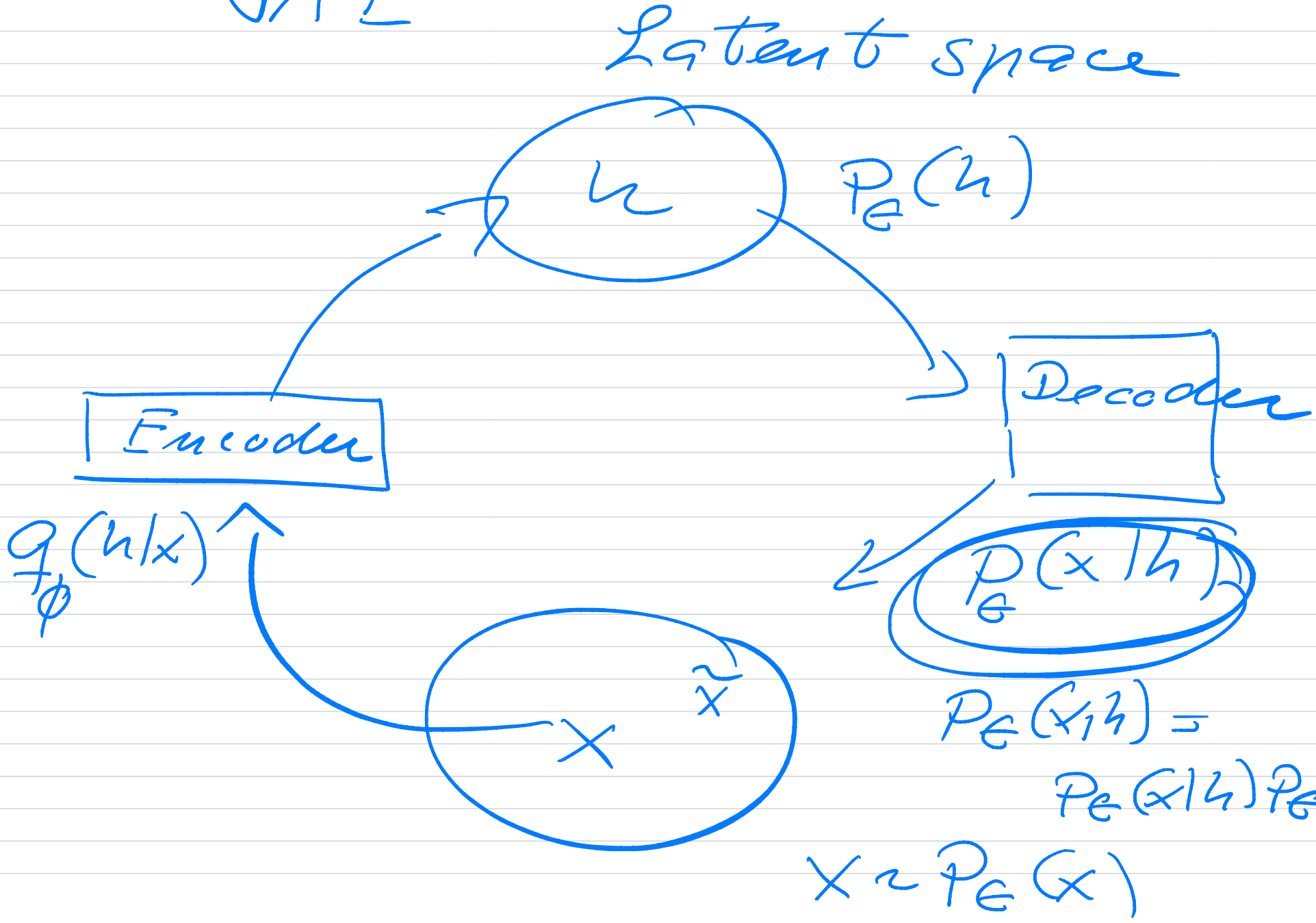
$$p(t_1) = T\, p(t_0)$$

$$p(t_m) = T^m p(t_0)$$

$$\lim_{m \to T} \quad p(t_T) = T^T p(t_T)$$



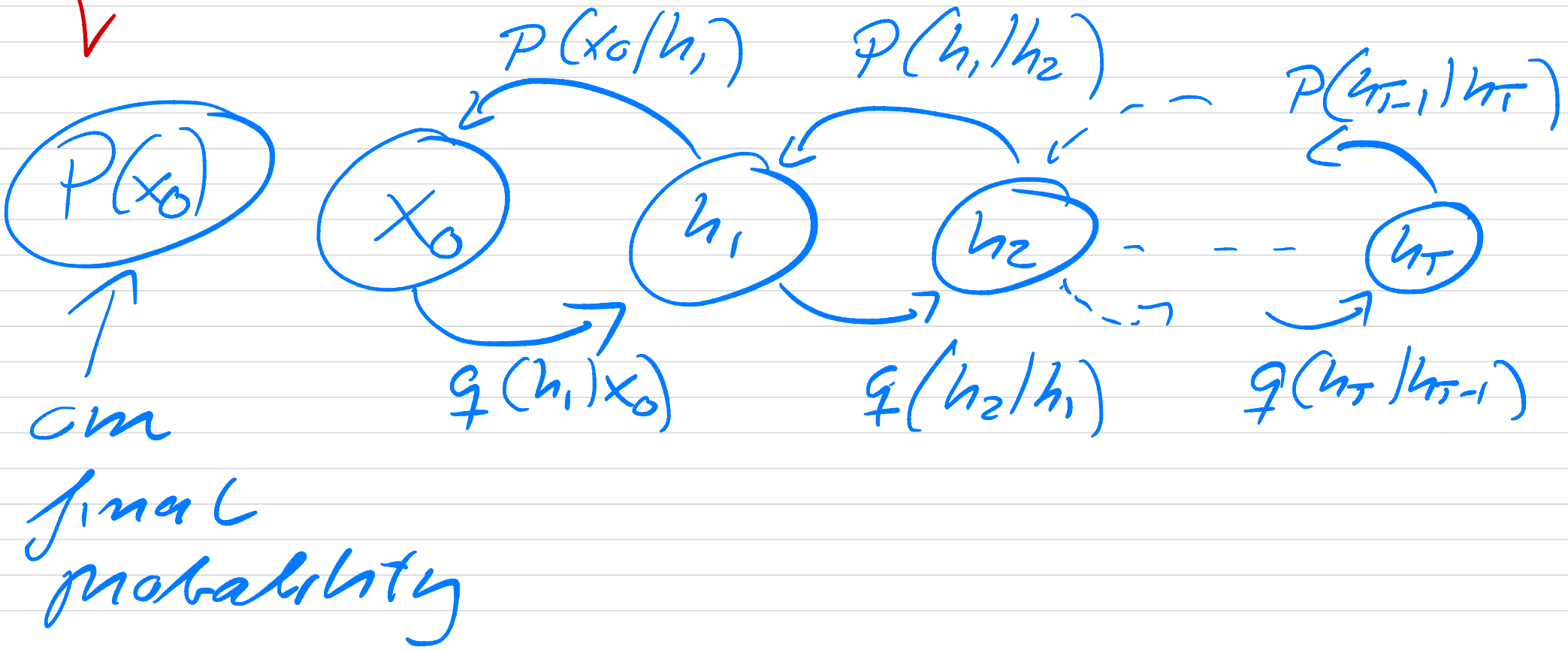
VAE


Latent space
z
$p_\theta(z)$
Encoder
Decoder
$q_\phi(z|x)$
$p_\theta(x|z)$
$\tilde{x}$
x
$p_\theta(x,z) =$
$p_\theta(x|z)\,p_\theta(z)$
$x \sim p_\theta(x)$

$$p_\theta(x) = \int dh\, p_\theta(x, h)$$

$$= \int dh\, p_\theta(x|h)\, p_\theta(h)$$

$$x \sim p_\theta(x)$$



our final probability