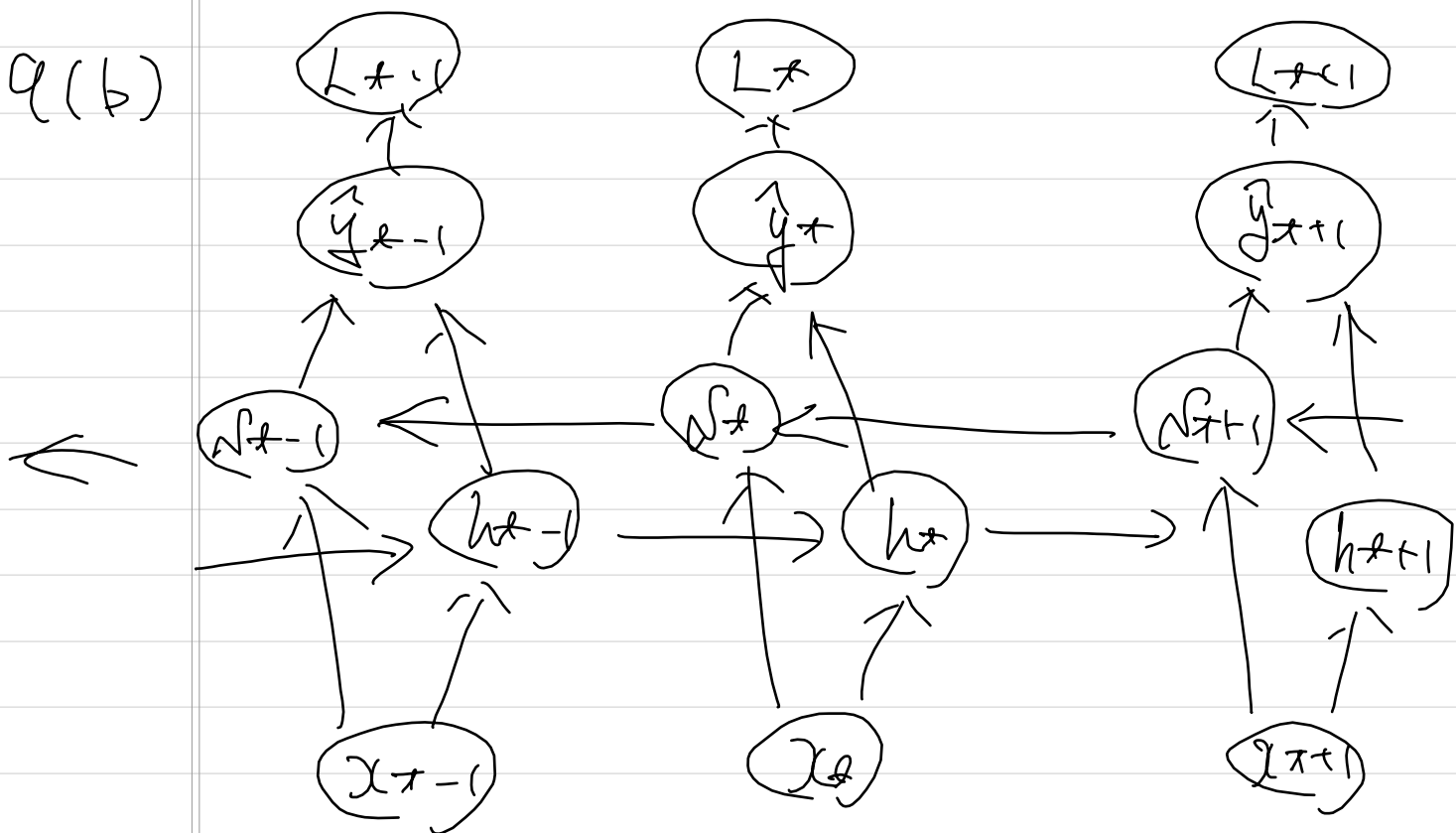


q(b)



$$\text{e.g. } \frac{\partial L_t}{\partial \theta} = \frac{\partial L_t}{\partial \hat{y}_t} \left(\frac{\partial \hat{y}_t}{\partial \theta} \right)$$

$$= \frac{\partial L_t}{\partial \hat{y}_t} \left(\frac{\partial \hat{y}_t}{\partial s_t} \left(\frac{\partial s_t}{\partial \theta} \right) + \frac{\partial \hat{y}_t}{\partial h_t} \left(\frac{\partial h_t}{\partial \theta} \right) \right)$$

$$= \frac{\partial L_t}{\partial \hat{y}_t} \left\{ \frac{\partial \hat{y}_t}{\partial s_t} \left(\frac{\partial s_t}{\partial x_t} + \frac{\partial s_t}{\partial s_{t+1}} \frac{\partial s_{t+1}}{\partial \theta} \right) + \frac{\partial \hat{y}_t}{\partial h_t} \left(\frac{\partial h_t}{\partial \theta} + \frac{\partial h_t}{\partial h_{t-1}} \frac{\partial h_{t-1}}{\partial \theta} \right) \right\}$$

$$\frac{\partial L_t}{\partial \hat{y}_t} \left\{ \frac{\partial \hat{y}_t}{\partial s_t} \left(\frac{\partial s_t}{\partial x_t} + \frac{\partial s_t}{\partial s_{t+1}} \frac{\partial s_{t+1}}{\partial \theta} \right) + \frac{\partial \hat{y}_t}{\partial h_t} \left(\frac{\partial h_t}{\partial \theta} + \frac{\partial h_t}{\partial h_{t-1}} \frac{\partial h_{t-1}}{\partial \theta} \right) \right\}$$