

## Proof of equation (7.3)

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First note

$$v_\pi(s) = E_\pi[G_{t:t+n} - \gamma^n V_{t+n-1}(S_{t+n}) + \gamma^n v_\pi(S_{t+n}) | S_t = s] \quad (1)$$

Then we can have

$$\begin{aligned} (7.3)_{left} &= \max_s |E_\pi[G_{t:t+n} | S_t = s] - E_\pi[G_{t:t+n} - \gamma^n V_{t+n-1}(S_{t+n}) + \gamma^n v_\pi(S_{t+n}) | S_t = s]| \\ &= \max_s |E_\pi[\gamma^n V_{t+n-1}(S_{t+n}) - \gamma^n v_\pi(S_{t+n}) | S_t = s]| \\ &\leq \gamma^n \max_s |V_{t+n-1}(s) - v_\pi(s)| \\ &= right \end{aligned} \quad (2)$$