Chapter 7 solutions **Hanna Gábor**

1. *In Chapter 6 we noted that the Monte Carlo error can be written as the sum of TD errors (6.6) if the value estimates don't change from step to step. Show that the n-step error used in (7.2) can also be written as a sum TD errors (again if the value estimates don't change) generalizing the earlier result.*

$$\begin{aligned} G_{t:t+n} - V(S_t) &= R_{t+1} + \gamma G_{t+1:t+n} - V(S_t) + \gamma V(S_{t+1}) - \gamma V(S_{t+1}) \\ &= \delta_t + \gamma(G_{t+1:t+n} - V(S_{t+1})) \\ &= \delta_t + \gamma\delta_{t+1} + \gamma^2\delta_{t+2} + \cdots + \gamma^{n-1}\delta_{t+n-1} + \gamma^n V(S_{t+n}) - \gamma^n V(S_{t+n}) \\ &= \sum_{k=t}^{t+n-1} \gamma^{k-t}\delta_k \end{aligned}$$