Reinforcement Learning - Exercise Sheet 3

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9. September 2020

3.1 Coding Assignment - Monte Carlo

1.

First we expand V_n:

$$V_n = \frac{\sum_{k=1}^{n} W_k G_k}{n} = \frac{W_n G_n + \sum_{k=1}^{n-1} W_k G_k}{n}$$

Multiplying with n yields

$$\begin{aligned} nV_n &= W_n G_n + \sum_{k=1}^{n-1} W_k G_k = W_n G_n + (n-1)V_{n-1} \\ \iff V_n &= \frac{n-1}{n} V_{n-1} + \frac{1}{n} W_n G_n \\ &= V_{n-1} + \frac{1}{n}(W_n G_n - V_{n-1}) \end{aligned}$$