

Exercise 5.4.3

We solve this exercise by invoking the uniformity-theory from sec. 5.4.

$$\mathbb{E}\left[\sum_{i=1}^5 w_i \mid X_1 = 5\right] = \mathbb{E}\left[\sum_{i=1}^5 u_i\right] = \sum_{i=1}^5 \mathbb{E}[u_i],$$

where the u_i 's are i.i.d with $u_i \sim U(0,1)$.

Hence,

$$\mathbb{E}\left[\sum_{i=1}^5 w_i \mid X_1 = 5\right] = \sum_{i=1}^5 \mathbb{E}[u_i] = 5 \cdot \frac{1}{2} = \frac{5}{2}.$$