Hand-in assignments
PhD course on Sequential Monte Carlo methods 2019

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H.1 Importance sampling theory

(a)

$$\begin{aligned}\mathbb{E}[\hat{Z}] &= \frac{1}{N}\sum_{i=1}^{N}\mathbb{E}\frac{\tilde{\pi}(x^i)}{q(x^i)} = \frac{1}{N}N\mathbb{E}_X\frac{\tilde{\pi}(x)}{q(x)} = \\ &= \int \frac{\tilde{\pi}(x)}{q(x)}q(x)dx = \int \tilde{\pi}(x)dx = \int Z\pi(x)dx = Z\int \pi(x)dx = Z\end{aligned} \tag{1}$$