Monte Carlo vs Variational Inference

Monte Carlo

$$\mathbb{E}_{p(x)}\, f(x) \approx \frac{1}{M}\sum_{s=1}^{M} f(x_s)$$

$$x_s \sim p(x)$$

Unbiased estimate (larger M => better accuracy)

Variational Inference (week 3)

$$p(x) \approx q(x)$$

$$\mathbb{E}_{p(x)}\, f(x) \approx \mathbb{E}_{q(x)}\, f(x)$$