

Monte Carlo Integration of h on $[a, b]$:

$$\int_a^b h(x) dx = \int_a^b \frac{h(x)}{f(x)} f(x) dx$$

$$= \int \frac{h(x)}{f(x)} \mathbb{I}\{a \leq x \leq b\} f(x) dx$$

$$= E_f \left(\frac{h(x)}{f(x)} \mathbb{I}\{a \leq x \leq b\} \right)$$

$$\approx \frac{1}{B} \sum_{i=1}^B \frac{h(x_i)}{f(x_i)} \mathbb{I}\{a \leq x_i \leq b\}$$

where x_1, x_2, \dots, x_B are iid draws from the distribution having density f .