Note 8

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2023-10-24

From last time:

$$\Theta = \int_x g(x)f(x)dx$$

$$x_1, .., x_n \sim f(x)$$

$$\hat{\theta}\frac{\Sigma g(x_1)}{m}$$

$$Var(\hat{\theta}) = \frac{\sigma^2}{m}$$

$$\hat{\sigma}^2 = \frac{\Sigma(g(x) - \bar{g}(x))^2}{m}$$

Estimate $Var(\hat{\theta}_{MC})$ by bootstrap

Antithetic variable

$$x_1, ...x_m \sim f(x)$$

$$u_1, ...u_m \sim Unif(0, 1)$$

$$Y = g(F^{-1}(u)) = h(u)$$

$$Y' = g(F^{-1}(u)) = h(1 - u)$$

$$corr(Y, Y') \leq 0$$

$$u_1, ...u_m \sim Unif(0, 1)$$