Importance Sampling

$$\int g(x)dx = \int \frac{g(x)}{f(x)} f(x)dx = E[Y].$$

$$\frac{1}{m}\sum_{i=1}^{m} Y_i = \frac{1}{m}\sum_{i=1}^{m} \frac{g(X_i)}{f(X_i)},$$

f(x) is the importance function.

A variância da estimativa é Var(Y) então queremos um f(x) bem próximo a g(x) para minimizar nossa variância

Importance Sampling

$$\int_0^1 \frac{e^{-x}}{1+x^2}\,dx$$

$$\begin{aligned}
f_0(x) &= 1, & 0 < x < 1,\\
f_1(x) &= e^{-x}, & 0 < x < \infty,\\
f_2(x) &= (1+x^2)^{-1}/\pi, & -\infty < x < \infty,\\
f_3(x) &= e^{-x}/(1-e^{-1}), & 0 < x < 1,\\
f_4(x) &= 4(1+x^2)^{-1}/\pi, & 0 < x < 1.
\end{aligned}$$

Importance Sampling

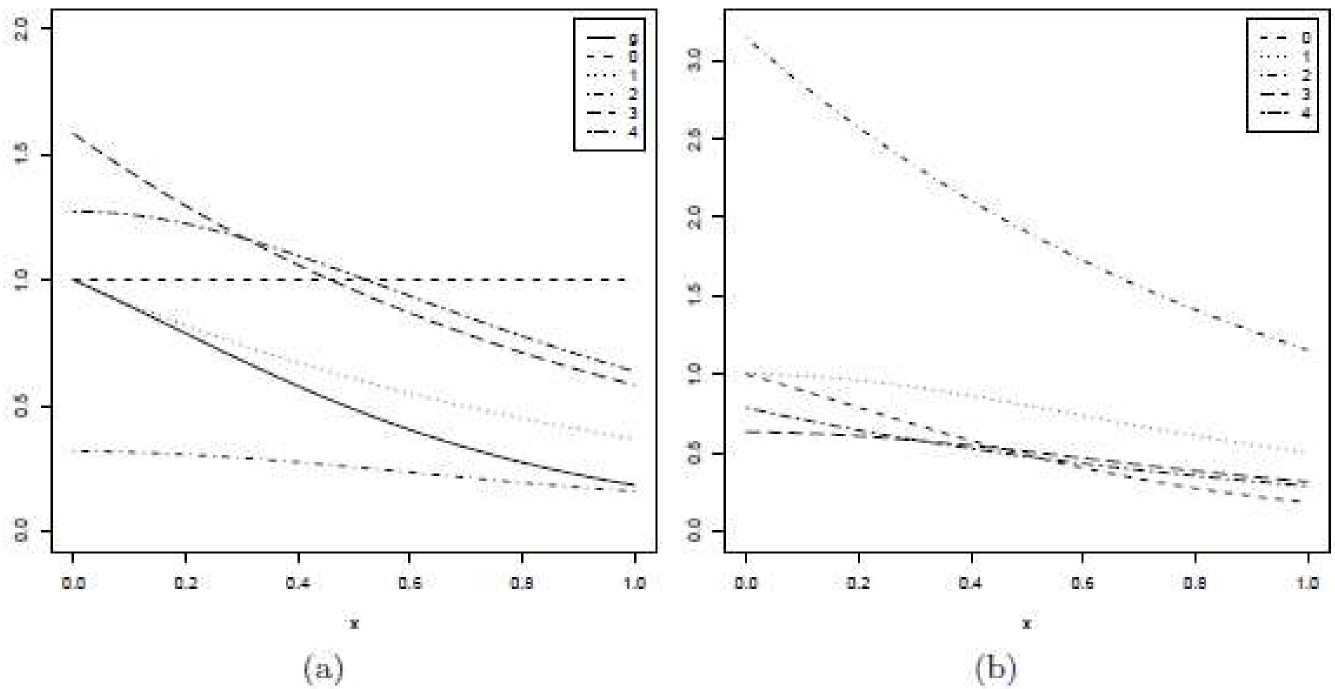

FIGURE 5.1: Importance functions in Example 5.10: $f_0, \ldots, f_4$ (lines 0:4) with $g(x)$ in (a) and the ratios $g(x)/f(x)$ in (b).