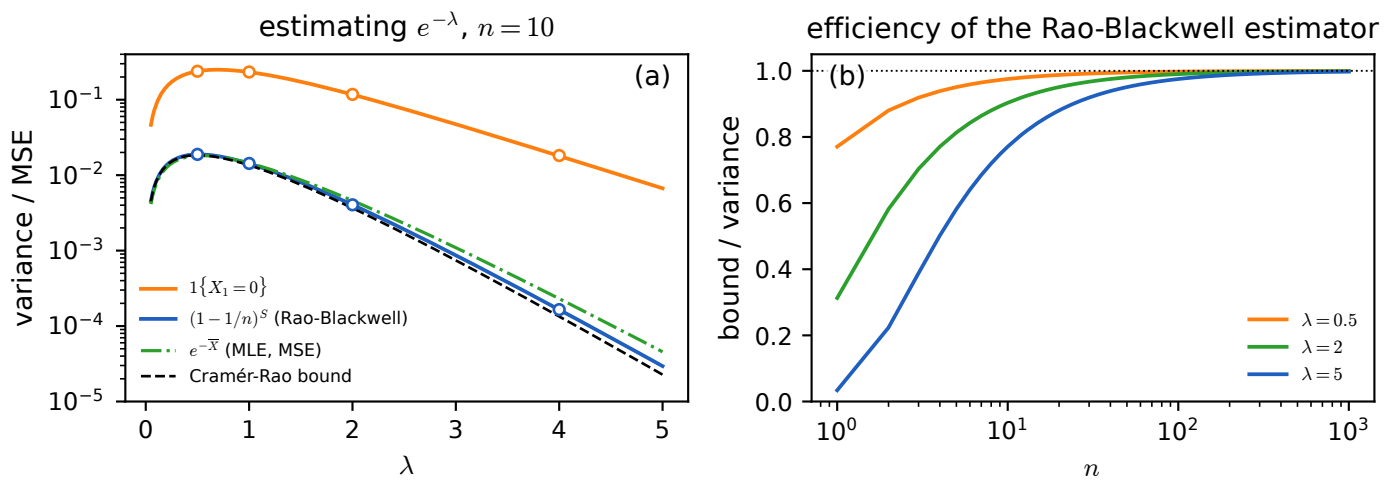

estimating $e^{-\lambda}$, $n = 10$
(a)
variance / MSE
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
0
1
2
3
4
5
λ
$1\{X_1 = 0\}$
$(1 - 1/n)^S$ (Rao-Blackwell)
$e^{-\overline{X}}$ (MLE, MSE)
Cramér-Rao bound
efficiency of the Rao-Blackwell estimator
(b)
bound / variance
1.0
0.8
0.6
0.4
0.2
0.0
10^0
10^1
10^2
10^3
n
$\lambda = 0.5$
$\lambda = 2$
$\lambda = 5$