

1. Let X_1, X_2, \dots, X_n be independent identically distributed random variables with probability mass function

$$g(t, \theta) = \theta(1 - \theta)^{t-1} I\{t = 1, 2, \dots\}.$$

Find the uniformly minimum variance estimator for $\frac{1}{\theta}$ (justify your answer).

2. Let X_1, X_2, \dots, X_n be independent identically distributed random variables with $P\{X_1 = 1\} = \theta$ and $P\{X_1 = 0\} = 1 - \theta$ for some $\theta \in (0, 1)$. Find the uniformly minimum variance unbiased estimator for $\theta(1 - \theta)$.