

- ① Suppose $x \in \mathcal{X} = \{1, 2, 3\}$ and we have the following statistical model.

$\theta \backslash x$	1	2	3
a	$1/2$	$1/3$	$1/6$
b	$1/4$	$1/4$	$1/2$
c	$1/5$	$4/5$	0
d	$1/3$	$1/2$	$1/6$

Suppose further that we are interested in the parameter $\tau = \mathbb{E}(x)$ where $\mathbb{P}(a) = \mathbb{P}(b) = 1$ and $\mathbb{P}(c) = \mathbb{P}(d) = 2$.

(a) Determine all the possible profile likelihood functions (equivalent up to positive constant multiples).

(b) For each of profile likelihoods determine a .5-profile likelihood region for τ .

- ② Consider a sample of n from the $N(\mu, \sigma^2)$ model with $(\mu, \sigma^2) \in (\mathbb{R} \setminus \{0\}) \times (0, \infty)$.

(a) Write the likelihood function in terms of the parameter (τ, σ^2) where $\tau = \sigma/\mu$.

(b) Determine the profile likelihood for τ .

3. E+R 6.2.20

4. E+R 6.3.25

5. E+R 6.3.26

6. E+R 6.3.27