HW1

Kevin Sheard

2023-01-24

Supposed the following data: 0, 2, 0, 2, 0 are observed from the distribution with pmf

p(x = 0; θ) = (1−θ)/3;

p(x = 1; θ) = 1/3;

p(x = 2; θ) = (1+θ)/3;

and 0, otherwise.

Find the MLE of θ. Calculate the MLE of

P(X = 2).

L(θ) = p(x=0;θ)p(x=2;θ)p(x=0;θ)p(x=2;θ)p(x=0;θ)

L(θ) = p(x=0;θ)^3 \* p(x=2;θ)^2

L(θ) = ((1−θ)/3)^3 \* ((1+θ)/3)^2

lnL(θ) = 3(ln(1-θ)-3) + 2(ln(1+θ)-3)

dlnL(θ)/dθ = -3/(1-θ) + 2/(1+θ)

uniroot(function(x) -3/(1-x) + 2/(1+x), c(-0.999,0.999)) $root

## [1] -0.2

MLE for θ is -0.2

MLE for p(X=2)