

## Worksheet 19

1. Let  $X \sim N(\mu, \sigma^2)$ , with  $\sigma^2 > 0$  a fixed and known constant. (a) Compute the Fisher Information  $\mathcal{I}(\mu)$ . (b) The MLE for  $\mu$  is equal to  $X$  (generally it's the mean, but in the one-observation case the mean is equal to  $X$ ). Find the efficiency of the MLE.

2. Let  $X \sim \text{Poisson}(\lambda)$ . (a) Compute the Fisher Information  $\mathcal{I}(\lambda)$ . (b) The MLE for  $\lambda$  is equal to  $X$  (generally it's the mean, but in the one-observation case the mean is equal to  $X$ ). Find the efficiency of the MLE.

3. Let  $X \sim \text{Binomial}(n, p)$  with  $n > 0$  a fixed and known constant. (a) Compute the Fisher Information  $\mathcal{I}(p)$ .<sup>1</sup> (b) The MLE for  $p$  is equal to  $X/n$ . Find the efficiency of the MLE.

<sup>1</sup> Try to simplify this as much as possible. You should be able to get something that has a denominator equal to  $p(1-p)$ .