

**MATH4/68181: Extreme values and financial risk**  
**Semester 1**  
**Problem sheet for Week 1**

1. If  $x_1, x_2, \dots, x_n$  is a random sample from

$$f(x) = \sigma^{-1} \exp\left(-\frac{1}{\sigma}x\right) \exp\left\{-\exp\left(-\frac{x}{\sigma}\right)\right\}$$

find the mle of  $\sigma$ .

2. If  $x_1, x_2, \dots, x_n$  is a random sample from

$$f(x) = \lambda \sigma^\lambda x^{-\lambda-1} \exp\left(-\sigma^\lambda x^{-\lambda}\right)$$

find the mles of  $\lambda$  and  $\sigma$ .

3. If  $x_1, x_2, \dots, x_n$  is a random sample from

$$f(x) = \lambda \sigma^{-\lambda} x^{\lambda-1} \exp\left(-\sigma^{-\lambda} x^\lambda\right)$$

find the mles of  $\lambda$  and  $\sigma$ .

4. If  $x_1, x_2, \dots, x_n$  is a random sample from

$$f(x) = (1 - \lambda x)^{1/\lambda-1}$$

find the mle of  $\lambda$ .