

MATH4/68181: Extreme values and financial risk
Semester 1
Problem sheet for Week 4

Suppose a portfolio contains α assets valued as X_1, \dots, X_α , where each is an exponential random variable with an unknown parameter λ . Then $X = \max(X_1, \dots, X_\alpha)$ will be the price of the most expensive asset. Find the following:

1. the cdf of X ;
2. the pdf of X ;
3. the n th moment of X ;
4. the mean of X ;
5. the variance of X ;
6. value at risk of X ;
7. the expected shortfall of X ;
8. maximum likelihood estimates of α and λ .