

**MATH48181/68181: EXTREME VALUES AND FINANCIAL RISK  
SEMESTER 1**

**QUIZ PROBLEM 6**

(Deadline: Tuesday 15 December 2020, 12:00noon)

Suppose  $X$  represents loss and has the following cumulative distribution function

$$F_X(x) = \frac{\theta \exp(-\lambda x)}{1 - (1 - \theta) \exp(-\lambda x)}$$

for  $x > 0$ ,  $\theta > 0$  and  $\lambda > 0$ . Derive explicit expressions for  $\text{VaR}_p(X)$  and  $\text{ES}_p(X)$ .

This problem is worth 1 mark. Marking scheme: 1 mark if the answer is correct, and the derivation is correct and detailed enough; 0.5 mark if the answer is correct, and the derivation is incorrect or not detailed enough; 0.5 mark if the answer is incorrect or not given, but the derivation is correct and detailed enough; 0 mark if the answer is correct, but the derivation is not detailed enough; 0 mark if the answer is incorrect, and the derivation is not detailed enough.

Please email your solution to [mbbsssn2@manchester.ac.uk](mailto:mbbsssn2@manchester.ac.uk) I will mark your solutions and email your mark, feedback and scanned work to you within 24 hours of the deadline. **PLEASE DO NOT FORGET TO WRITE YOUR FULL NAME AND ID.**