

MATH48181/68181: EXTREME VALUES AND FINANCIAL RISK

SEMESTER 1

QUIZ PROBLEM 5

(Deadline: Tuesday 8 December 2020, 12:00noon)

Suppose a portfolio is made of up of two dependent investments. Let X and Y denote the losses. Assume that X and Y have the joint probability density function

$$f_{X,Y}(x,y) = \begin{cases} \alpha_1\beta_2 \exp(-\beta_2y - \gamma_2x), & \text{if } 0 \leq x < y, \\ \alpha_2\beta_1 \exp(-\beta_1x - \gamma_1y), & \text{if } 0 \leq y < x. \end{cases}$$

Find the probability density and cumulative distribution functions of the total portfolio loss.

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 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.