

**MATH48181/68181: EXTREME VALUES AND FINANCIAL RISK**  
**SEMESTER 1**  
**QUIZ PROBLEM 10**  
(Deadline: 11:00am on Wednesday, 5 January 2022)

Consider a bivariate distribution specified by the joint survival function

$$\bar{G}(x, y) = \exp \left\{ -(x + y) \sum_{i=1}^p w_i A_i \left( \frac{y}{x + y} \right) \right\}$$

for  $x > 0$  and  $y > 0$ , where  $w_1, \dots, w_p$  are non-negative numbers summing to 1, and  $A_i(\cdot)$  is a convex function satisfying  $A_i(0) = A_i(1) = 1$  and  $\max(w, 1 - w) \leq A_i(w) \leq 1$ . Show that the distribution is a bivariate extreme value distribution. Please give full details.

**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 use Blackboard to submit your answer.**