A Continuous Extension that Preserves Concavity, Monotonicity and Lipschitz Continuity

Borradores de Economia
Número:
230
Publicado:
Miércoles, 1 Enero 2003
Clasificación JEL:
C02, C20
Palabras clave:
Concavity, Monotonicity, Lipschitz, Continuity
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The following is proven here: let W : X × C ? R, where X is convex, be a continuous and bounded function such that for each y?C, the function W (·,y) : X ? R is concave (resp. strongly concave; resp. Lipschitzian with constant M; resp. monotone; resp. strictly monotone) and let Y?C. If C is compact, then there exists a continuous extension of W, U : X × Y ? [infX×C W,supX×C W], such that for each y?Y, the function U(·,y) : X ? R is concave (resp. strongly concave; resp. Lipschitzian with constant My; resp. monotone; resp. strictly monotone).