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A POSTSCRIPT TO „C-BINARY RELATIONS AND PAIRWISE NORMALITY"

BY

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We shall use the notation and terminology of [1]. Throughout this note, when we are concerned to T_i and T_j for a bitopological space (X, T_1, T_2), we suppose $i \neq j$ and $i, j = 1, 2$.

In a recent paper [1, theorem 2] we prove an insertion and extension theorem for pairwise normal spaces. From this theorem we derive, among other results, the following [1, corollary 2.2]: Let C be a T_1-closed and T_2-closed set in the pairwise normal space (X, T_1, T_2). Let Φ be a upper (lower) bounded function on C T_i-l. s.c. and T_j-u.s.c. on C. Then there is a real-valued function h on X T_i-l.s.c. and T_j-u.s.c. on X such that $h(x) = \Phi(x)$ for every $x \in C$.

Unfortunately, this result is not correct as we prove in the next variant of a Lane's example.

Example. Let X be the set of real numbers. Let T_1 be the discrete topology on X and let T_2 consist of the void set and complements of countable sets. (X, T_1, T_2) is a pairwise normal space. Let C be the set of all negative integer numbers and let the function Φ on C defined by $\Phi(x) = x$ for every $x \in C$. We have that C and Φ verify the hypothesis of [1, corollary 2.2] but Φ does not admit an extension T_1-l.s.c. and T_2-u.s.c. to X since X is uncountable.

In [2, proposition 11] Lane proves an extension theorem for T_i and T_j-zero sets. By using a similar technique to that in Lane's result we obtain the following modification of corollary 2.2 in [1].

Theorem. *Let C be a T_i-zero set and T_j-closed set in the pairwise normal space (X, T_1, T_2). Let Φ be a upper (lower) bounded function on C, T_i-l.s.c. and T_j-u.s.c. (T_j-l.s.c. and T_i-u.s.c.) on C. Then there is a real-valued function h on X T_i-l.s.c. and T_j-u.s.c. (T_j-l.s.c. and T_i-u.s.c.) on X such that $h(x) = \Phi(x)$ for every $x \in C$.*

Proof. Let Φ be a upper bounded function on the T_i-zero set and T_j-closed set C. Then C is T_i-closed and T_j-closed. By hypothesis, Φ is T_i-l.s.c. and T_j-u.s.c. on C. Let $\psi = \Phi/(1 + |\Phi|)$. By [2, theorem 2.6] there exists a T_i-l.s.c. and T_j-u.s.c. function F on X such that $-1 \leqslant F \leqslant 1$ and $F(x) = \psi(x)$ for every $x \in C$. Since Φ is upper bounded on C it is clear that there exists a constant $\alpha < 1$ satisfying $-1 < \psi(x) \leqslant \alpha$ for every $x \in C$. Hence, $-1 \leqslant F(x) \leqslant \alpha < 1$

for every $x \in X$. By following Lane's technique and his notation, we obtain the function

$$h = \frac{F_1 - G}{1 - |F_1 - G|},$$

which is T_t-l.s.c. and T_j-u.s.c. on X and satisfies $h(x) = \Phi(x)$ for every $x \in C$.

If Φ is a lower bounded function T_j-l.s.c. and T_t-u.s.c. on the T_i-zero set and T_j-closed set C then $-\Phi$ is upper bounded T_i-l.s.c. and T_j-u.s.c. on C and the result follows from the „upper bounded" case. The proof is complete.

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SOLVABILITY RESULTS FOR (STRONGLY) SELF-ACCRETIVE MAPS

BY

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0. **Introduction.** Let X and Y be B a n a c h spaces, Y^* the (topological) *dual* of Y and 2^{Y^*} the class of all nonempty parts of it. Given the mapping $T: X \to Y$, call it *strongly accretive* modulo $\varphi: X \to 2^{Y^*}$ or, simply, *strongly φ-accretive* (B r o w d e r [5]) when for each $x, u \in X$ there exists $y^* \in \varphi(u-x)$ with

$$\text{(A)} \qquad \langle Tx - Tu, y^* \rangle \geq c \| x - u \|^2,$$

(the constant $c > 0$ being independent of x and u) and, respectively, *locally strongly φ-accretive* (K i r k [15]) in case (A) holds locally (modulo x). These rather technical variants of accretivity were introduced in an effort of unifying the theories of *monotone* maps, corresponding to $Y = X^*$ and (*standard*) *accretive* maps, corresponding to $Y = X$, with respect to the basic problem of determining sufficient conditions under which T be surjective or, equivalently (with a suitable translated map) the operator equation $Tx = 0$ be solvable in X. As remarked by K i r k and S c h ö n e b e r g [16], the increasing interest in these problems is motivated, among others, by the fundamental role of accretivity in the ordinary differential equations theory over B a n a c h spaces, and, in fact, many contributions in this area such as those of M a r t i n [18], K a r t s a t o s [14], R e i c h [24], D e i m l i n g [8] or M o r a l e s [19] are based on such a connection. In parallel to these efforts, an essentially different way of attacking the same problem is the (metrical) maximality one, started by K i r k (see the above reference) and subsequently developed by R a y [23], P a r k and P a r k [20], K o b a y a s h i [17], and others. Finally, as results from the papers by G a t i c a and K i r k [11] or P e t r y s h y n [21], the topological degree techniques can be used as well to derive rather deep results of this kind.

Concerning our developments, it the moment to specify that the main statements of the present exposition were obtained on the basis of the second category of methods we just enumerated, applied to a special class of (strongly) φ-accretive maps, characterized as (for some couple $d: [0, \infty)^2 \to [0, \infty)$, $\varphi: X^2 \to 2^{Y^*}$),

$$\text{(SA)} \quad \langle Tx - Tu, y^* \rangle \geq d(\| Tx \|, \| x - u \|) \, \| Tx - Tu \|, \text{ with } y^* \in \varphi(x, u),$$

introduced, in a „non-directional" context ($d(t, s) = dt$, $\varphi(x, u) = \varphi(x)$) by B r o w d e r in his 1972 paper [6] and called in the sequel (*strongly*) *self-accretive* because the term $[Tx - Tu]$ appears in both sides of the compa-