

# Toposym 2

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On discontinuous selectors

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## ON DISCONTINUOUS SELECTORS

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Let  $X$  be an arbitrary set and  $\mathcal{L}$  a field of subsets of  $X$ . Let  $\mathcal{S}$  denote the family of countable unions of members of  $\mathcal{L}$ .

Let, further,  $2^Y$  denote the space of all closed non void subsets of a topological space  $Y$  (with the Vietoris topology).

**Theorem.** *Let  $Y$  be complete separable and let  $F : X \rightarrow 2^Y$  be such that*

$$\{x : F(x) \cap G \neq \emptyset\} \in \mathcal{S} \text{ whenever } G \subset Y \text{ is open.}$$

*Then there is a selector  $f : X \rightarrow Y$  (i.e.  $f(x) \in F(x)$ ) such that*

$$f^{-1}(G) \in \mathcal{S} \text{ whenever } G \subset Y \text{ is open.}$$

**Corollary.** *For each complete separable space  $Y$  there is a choice function  $f : 2^Y \rightarrow Y$  of the first class of Baire.*

$f$  may be assumed continuous if  $\dim Y = 0$  (i.e. if  $Y$  contains a countable base composed of closed-open sets).

There are also given further applications of these statements.

The main results presented in this communication appeared in the paper of K. Kuratowski and C. Ryll-Nardzewski in the Bull. of the Polish Academy of Sciences 13 (1965), pp. 397–403, under the title “A general theorem on selectors”.