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PROBLEM SECTION

Contributed Problems

The Problems Editor invites anyone who has published a paper in *Topology Proceedings* or has attended a Spring or Summer Topology Conference to submit problems to this section. They need not be related to any articles which have appeared in *Topology Proceedings* or elsewhere, but if they are, please provide full references. Please define any terms not in a general topology text nor in referenced articles.

Problems which are stated in, or relevant to, a paper in this volume are accompanied by the title of the paper where further information about the problem may be found. Comments of the proposer or submitter of the questions are so noted; comments of the Problems Editor are not specially noted. Information on the status of previously posed questions is always welcome. Submission of questions and comments by email in TEX form is strongly encouraged, either to topolog@mail.auburn.edu or directly to the Problems Editor at mayer@math.uab.edu.

G. Mappings of Continua and Euclidean Spaces.

38. (J.J. Charotonik and W.J. Charotonik, *A weaker form of the property of Kelley*) What classes of mappings preserve the property of being semi-Kelley? In particular, is the property preserved under (a) monotone or (b) open mappings?

39. (J.J. Charotonik and W.J. Charotonik, *ibid.*) Is it true that if a continuum Y has the property of Kelley and X is an arbitrary continuum, then the uniform limit of semi-confluent mappings from X onto Y is semi-confluent?

38–39 Comments of the proposers. A (metric) continuum X is said to have the *property of Kelley* provided that for each point $x \in X$, for each subcontinuum K of X containing X, and for each sequence of points x_n converging to x, there exists a sequence of subcontinua K_n of X containing x_n and converging to K.

Let K be a subcontinuum of a continuum X. A continuum $M \subset K$ is called a *maximal limit continuum in* K provided that there is a sequence of subcontinua M_n of X converging to M such that for each converging sequence of subcontinua M'_n of X with $M_n \subset M'_n$ for each $n \in \mathbb{N}$ and $\lim M'_n = M' \subset K$, we have $M = M'$.

A continuum is said to be *semi-Kelley* provided that for each subcontinuum K of X and for every two maximal limit continua M_1 and M_2 in K, either $M_1 \subset M_2$ or $M_2 \subset M_1$.

A mapping $f : X \to Y$ between continua is said to be *semi-confluent* provided that for each subcontinuum Q of Y and for every two components C_1 and C_2 of the inverse image $f^{-1}(Q)$, either $f(C_1) \subset f(C_2)$ or $f(C_2) \subset f(C_1)$.

See also Questions P48 and P49.

L. Topological Algebra.

44. (V. Bergleson, N. Hindman, and R. McCutcheon, *Notions of size and combinatorial properties of quotient sets in semigroups*) In a group, if A and B are both right syndetic, does it follow that $AA^{-1} \cap BB^{-1}$ necessarily contains more than the identity?

45. (V. Bergleson, N. Hindman, and R. McCutcheon, *ibid.*) If $m_l(B) > 0$ in a left amenable semigroup, and A is infinite, does $BB^{-1} \cap AA^{-1}$ necessarily contain elements different from the identity?

O. Theory of Retracts; Extension of Continuous Functions.

16. (Kaori Yamazaki, *Extensions of partitions of unity*) Let X be a space, A a subspace and γ an infinite cardinal. Find a nice class $\mathcal{P}$ of spaces such that A is P^γ (locally finite)-embedded in X if and only if every continuous map f from A into any $Y \in \mathcal{P}$ can be continuously extended over X.

P. Products, Hyperspaces, Remainders, and Similar Constructions.

45. (E. Castañeda, *A unicoherent continuum whose second symmetric product is not unicoherent*) Does there exist an indecomposable continuum X such that $F_2(X)$ is not unicoherent?

46. (E.Castañeda, *ibid.*) Does there exist an hereditarily unicoherent continuum X such that $F_2(X)$ is not unicoherent?

47. (J.J. Charatonik) Does there exist an hereditarily unicoherent, hereditarily decomposable continuum X such that $F_2(X)$ is not unicoherent.

45–47 Comment. The space $F_2(X)$ is the hyperspace of two-point subsets of X.

48. (J.J. Charotonik and W.J. Charotonik, *A weaker form of the property of Kelley*) Is it true that if a continuum X has the property of Kelley, then the Cartesian product $X \times [0,1]$ is semi-Kelley?

49. (J.J. Charotonik and W.J. Charotonik, *ibid.*) Is it true that if a continuum X is semi-Kelley, then the hyperspace 2^X (respectively, $C(X)$) is contractible?

48–49 Comments. See the Comment after Questions G38–39 for the definitions of *property of Kelley* and *semi-Kelley.* For a given metric continuum X, we denote the hyperspace of all nonempty closed subsets of X by 2^X and the hyperspace of all nonempty subcontinua of X by $C(X)$.

See also Questions G38 and G39.