

A note on fixed point theorems in metric spaces

DARIUSZ WARDOWSKI and NGUYEN VAN DUNG

ABSTRACT.

In this paper, we show that the existence of fixed points in some known fixed point theorems in the literature is a consequence of the Banach contraction principle.

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REFERENCES

- [1] Agarwal, R. P., Meehan, M. and O'Regan, D., *Fixed point theory and applications*, Cambridge University Press, 2004
- [2] Berinde, V., *Iterative approximation of fixed points*, Lecture Notes in Mathematics, Springer, 2006
- [3] Bessaga, C., *On the converse of the Banach fixed-point principle*, Colloq. Math., **7** (1959), 41–43
- [4] Bianchini, R. M. T., *Su un problema di S. Reich aguardante la teoria dei punti fissi*, Boll. Un. Mat. Ital., **5** (1972), 103–108
- [5] Čirić, L. B., *Generalized contractions and fixed-point theorems*, Publ. Inst. Math. (Beograd)(N.S.), **12** (1971), No. 26, 19–26
- [6] Collaco, P. and Silva, J. C. E., *A complete comparison of 25 contraction conditions*, Nonlinear Anal., **30** (1997), No. 1, 471–476
- [7] Goebel, K. and Reich, S., *Uniform Convexity, Hyperbolic Geometry, and Nonexpansive Mappings*, Marcel Dekker, New York, 1984
- [8] Hardy, G. E. and Rogers, T. D., *A generalization of a fixed point theorem of Reich*, Canad. Math. Bull., **16** (1973), No. 2, 201–206
- [9] Jachymski, J., *A short proof of the converse to the contraction principle and some related results*, Topol. Methods Nonlinear Anal., **15** (2000), 179–186
- [10] Janos, L., *A converse of Banach's contraction theorem*, Proc. Amer. Math. Soc., **16** (1967), 287–289
- [11] Kannan, R., *Some results on fixed points II*, Amer. Math. Monthly, **76** (1969), No. 4, 405–408
- [12] Reich, S., *Some remarks concerning contraction mappings*, Canad. Math. Bull., **14** (1971), No. 1, 121–124
- [13] Rhoades, B. E., *A comparison of various definitions of contractive mappings*, Trans. Amer. Math. Soc., **226** (1977), 257–290
- [14] Rhoades, B. E., *A biased discussion of fixed point theory*, Carpathian J. Math., **23** (2007), No. 1-2, 11–26
- [15] Zamfirescu, T., *Fix point theorems in metric spaces*, Arch. Math. (Basel), **23** (1972), 292–298

DEPARTMENT OF NONLINEAR ANALYSIS
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE
UNIVERSITY OF ŁÓDŹ
BANACHA 22, 90-238 ŁÓDŹ, POLAND
E-mail address: wardd@math.uni.lodz.pl

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Corresponding author: Dariusz Wardowski; wardd@math.uni.lodz.pl

FACULTY OF MATHEMATICS AND INFORMATION TECHNOLOGY
TEACHER EDUCATION
DONG THAP UNIVERSITY
CAO LANH CITY, DONG THAP PROVINCE, VIETNAM
E-mail address: nvdung@dthu.edu.vn