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Totally boundedness and uniform continuity via quasi Cauchy sequences

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Abstract: A subset E of a metric space X is totally bounded if and only if any sequence of points in E has a quasi Cauchy subsequence, where a sequence (x_n) is quasi-Cauchy if the sequence $(d(x_{n+1}, x_n))$ is a null sequence. A function f from a totally bounded subset of a metric space X into a metric space Y preserves quasi Cauchy sequences if and only if it is uniformly continuous, i.e. $(f(x_n))$ is a quasi Cauchy sequence whenever (x_n) is a quasi Cauchy sequence of points of E.

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