Note on Banach space

Banach space. A vector space that possesses a norm which allows computation of vector length and distance between vectors and that is complete in the sense that Cauchy sequences converge.

Cauchy sequence. A sequence $a_1, a_2, \ldots$ such that the metric $d(a_m, a_n)$ satisfies $\lim_{\min(m,n)\to\infty} d(a_m, a_n) = 0$. Cauchy sequences in the rationals do not necessarily converge, but they do converge in the reals.

Axioms of every metric:

1. $d(x, y) = d(y, x)$,
2. $d(x, y) = 0$ when $x = y$,
3. $d(x, y) \leq d(x, z) + d(z, y)$ (triangle inequality)

References

[1] (1983) *Kleine Enzyklopädie Mathematik* VEB Bibliographisches Institut Leipzig

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