



# Bounded Linear Continuous

## 1 Why

All continuous functions between norm spaces are bounded linear functions.

## 2 Result

**Proposition 1.** *Let  $((V_1, F), |\cdot|_1)$  and Let  $((V_2, F), |\cdot|_2)$  be two norm spaces. Let  $f : V_1 \rightarrow V_2$  be a linear function between two norm spaces. Then*

1.  $\exists x \in V_1$  such that  $f$  is continuous at  $x$ ,
2.  $f$  is continuous,
3.  $f$  is uniformly continuous, and
4.  $f$  is bounded,

*are all equivalent conditions.*