MA30041: Metric Spaces

Essay-Writing Competition

Introduction: On a vector space V (like $\mathbb{R}^n$ or $\mathbb{C}^n$), the notions "*metric*", "*norm*" and "*scalar product*" are closely related: A scalar product $\langle \cdot, \cdot \rangle : V \times V \to \mathbb{C}$ yields a norm $\|\boldsymbol{x}\| = \sqrt{\langle \boldsymbol{x}, \boldsymbol{x} \rangle}$. Also, a norm $\| \cdot \| : V \to \mathbb{R}_{\geq 0}$ yields a metric via $d(\boldsymbol{x}, \boldsymbol{y}) = \|\boldsymbol{x} - \boldsymbol{y}\|$. However, the converse statements are in general false (so there are norms which cannot be defined via a scalar product).

Task: First, recall the precise definitions of "*metric*", "*norm*" and "*scalar product*". Then, write an essay – understandable either by your grandparents or even your dog – that explain these concepts and their differences. Pagelimit is one page!

Deadline: You may work in pairs/groups on the essay. Please hand in your essay (as PDF) via Moodle in 6 weeks (Monday 10 November & Tuesday 11 November). Details will follow.

Votes: All essays will be published on the Moodle-site of this unit after the deadline. Everyone has then three weeks to vote on the most original essay.

Prices: The three essays with the most votes will receive vouchers of GBP 30.–, GBP 20.– and GBP 10.– respectively for the Parade Bar or the book shop.