MA 26500-215   Quiz 10

July 25, 2016

1. Let $L\colon \mathbb{R}^3 \to \mathbb{R}^2$ be a linear map. Suppose that

$$L(1,1,0) = (1,1) \qquad\qquad L(0,0,1) = (1,-1)$$

   Find $L(1,1,1)$.

2. (4 points) Does there exist a linear map $L\colon \mathbb{R}^2 \to \mathbb{R}$ such that for every vector $(x_1, x_2) \in \mathbb{R}^2$,

$$|L(x_1, x_2)| \leq 1?$$

   [*Hint*: Consider the map $L(x_1, x_2) = x_1$. What goes wrong if we demand that $|L(x_1, x_2)| = |x_1| \leq 1$?]