MTH 331 – Problem 57-1

Robert Ritchie

October 29, 2015

If S is the stretching transformation on $\mathbb{R}^2$, defined by

$$S(x, y) = (7x, 7y),$$

and T is the transformation on $\mathbb{R}^2$ defined by

$$T(x, y) = (2x + 3y, 7x - 5y),$$

do S and T commute?

Proof. Let $(x, y) \in \mathbb{R}^2$

$$\begin{aligned} TS(x, y) &= T(7x, 7y) \\ &= (14x + 21y, 49x - 35y) \\ &= S(2x + 3y, 7x - 5y) \\ &= ST(x, y) \end{aligned}$$

□