

Additional Exercise: Let L_1 be the x -axis in \mathbf{R}^2 , and let L_2 be the line given by the equation $y = x$. Let R_i be the reflection at the line L_i for $i = 1, 2$.

- (a) Show that $R_1(x, y) = (x, -y)$ and $R_2(x, y) = (y, x)$. It suffices to draw representative pictures for a point (x, y) .
- (b) Calculate $R_2R_1(x, y) = R_2(R_1(x, y))$ and $R_1R_2(x, y) = R_1(R_2(x, y))$.
- (c) According to what we did in class R_1R_2 and R_2R_1 are rotations. Determine the angle. (*Hint:* Calculate the dot product between (x, y) and $R_1R_2(x, y)$).
- (d) Calculate the orders of R_1 , R_2 , R_1R_2 and R_2R_1 . Here the order of the operation T on \mathbf{R}^2 is the smallest power n such that T^n is the identity map.