Supplementary Problem to Hw6

1. For each of the following transformations on $\mathbb{R}^2$, find the standard matrix of the transformation with respect to the **homogeneous coordinate system** and verify your answer using the standard basis e_1 and e_2.

(a) The transformation L that rotates each vector by 120 degrees in the counterclockwise direction.

(b) The transformation L that translates each point 3 units to the left and 5 units up.

(c) The transformation L that contracts each vector by a factor of one third.

(d) The transformation that reflects a vector about the y-axis and then translates it up 2 units.