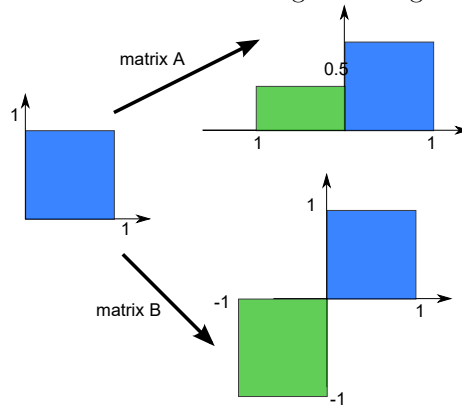# Computer Graphics: Assignment 03

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3. Transformations

A and B are both scaling-mirroring matrices.

- Rotating an object without translating it equals a translation around the coordinate center.

- Rotating after translating the center of the rectangle to zero results in a rotation around the rectangle center. (And a translation of (-3,2) if there is it is not translated back afterwards).

- Rotating after tranlation of V_1 to the coordinate center will result in the rectangle rotated around V_1 and shifted by (-2,2).

- Yes it is possible if you work with homogeneous coordinates. Transform vertices to homogeneous coordinates $((2,2) \rightarrow (2,2,1)$ etc.) and multiply with matrix

$$P = \begin{pmatrix} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} \frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & 0 \\ \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & -2 \\ 0 & 1 & -2 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} \frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & 2 \\ \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & 2 - 2\sqrt{2} \\ 0 & 0 & 1 \end{pmatrix}.$$