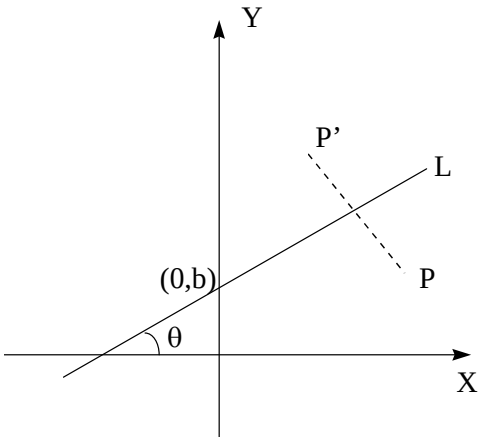
COMP2004 Computer Graphics Tutorial 2
Two-dimensional transformations & Visualizations

1. Derive the transformation matrix for reflection about a line L with slope m and y intercept b as shown in the figure below.



2. Using the standard 2D transformation matrices on translation, scaling and rotation, prove mathematically that the inverse matrices of each of them is equivalent to the matrix performing the respective reverse transformations, i.e., prove mathematically that

$$\mathrm{Trans}^{-1}(\boldsymbol{m},\boldsymbol{n}) = \mathrm{Trans}(-\boldsymbol{m},-\boldsymbol{n}),$$

$$\mathrm{Scale}^{-1}(\boldsymbol{Sx},\boldsymbol{Sy}) = \mathrm{Scale}\left(\frac{1}{\boldsymbol{Sx}},\frac{1}{\boldsymbol{Sy}}\right),$$

$$\mathrm{Rot}^{-1}(\alpha) = \mathrm{Rot}(-\alpha)$$

3. Find the transformation that maps a window whose lower left corner is at (1,1) and upper right corner is at (3,5) onto
   (i) the entire device screen whose dimension is (600, 500)
   (ii) a viewport that has lower left corner at (100,100) and upper right corner at (400,400)