State Estimation - Assignment 1.1

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1 Question 2

f) Repeat part e), for the following values:

$$\mathbf{x} = \begin{bmatrix} 1 \text{ m} \\ 0.5^\circ \end{bmatrix}, \quad \mathbf{\Sigma} = \begin{bmatrix} 0.01 & 0 \\ 0 & 0.005 \end{bmatrix},$$
$$\mathbf{x} = \begin{bmatrix} 1 \text{ m} \\ 0.5^\circ \end{bmatrix}, \quad \mathbf{\Sigma} = \begin{bmatrix} 0.01 & 0 \\ 0 & 0.1 \end{bmatrix},$$
$$\mathbf{x} = \begin{bmatrix} 1 \text{ m} \\ 0.5^\circ \end{bmatrix}, \quad \mathbf{\Sigma} = \begin{bmatrix} 0.01 & 0 \\ 0 & 0.5 \end{bmatrix},$$
$$\mathbf{x} = \begin{bmatrix} 1 \text{ m} \\ 0.5^\circ \end{bmatrix}, \quad \mathbf{\Sigma} = \begin{bmatrix} 0.01 & 0 \\ 0 & 1 \end{bmatrix}.$$

Answer: The covariance matrix cov x contains elements that represent the relationship between the r and theta coordinates of the original samples. Larger values indicate greater variance or stronger covariance, while smaller values indicate lower variance or weaker covariance. When cov x has larger values, the transformed distribution will exhibit a broader dispersion along the r and theta axes.

The ellipses depicted in each plot convey the shape and orientation of the transformed distribution. The width and height of the ellipse are determined by the eigenvalues of the covariance matrix cov y. Larger eigenvalues indicate greater variability along the corresponding eigenvectors, resulting in a wider ellipse. The angle of the ellipse indicates the orientation of the transformed distribution.

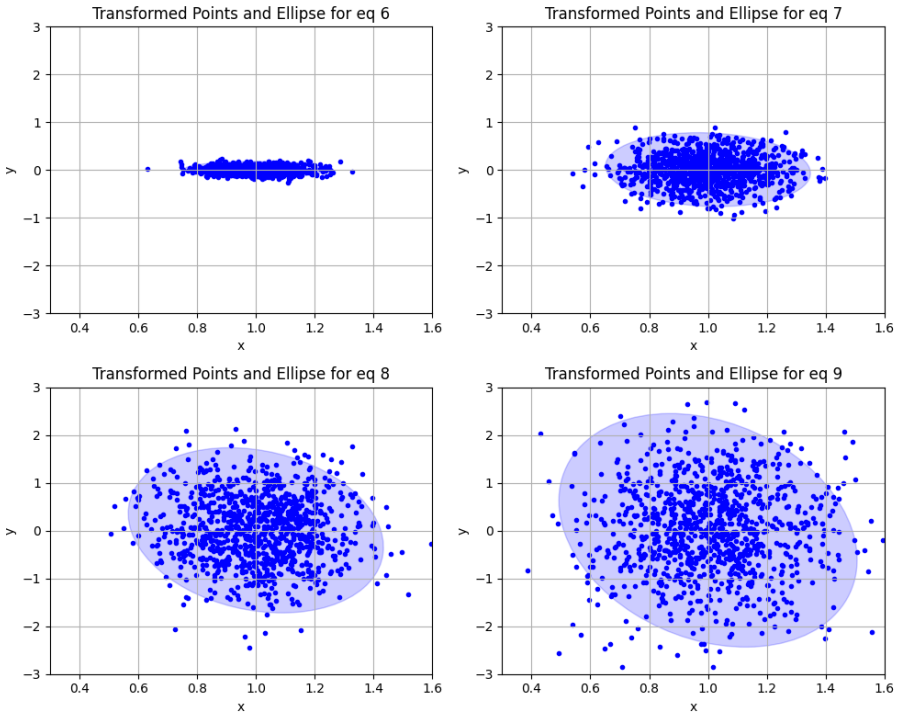

Figure 1: Different values of covariance x