Effect of Linear Transformations

Consider a data set $\mathcal{D} = \{\boldsymbol{x}_1, \ldots, x_N\}$, $\boldsymbol{x}_n \in \mathbb{R}^D$, with

$$\mathbb{E}[D] = \boldsymbol{\mu}$$
$$\mathbb{V}[D] = \boldsymbol{\Sigma}$$

If we now modify every $\boldsymbol{x}_i \in \mathcal{D}$ according to

$$\boldsymbol{x}'_i = \boldsymbol{A}\boldsymbol{x}_i + \boldsymbol{b}$$

for a given $\boldsymbol{A}, \boldsymbol{b}$, then

$$\mathbb{E}[\mathcal{D}'] = \boldsymbol{A}\boldsymbol{\mu} + \boldsymbol{b}$$
$$\mathbb{V}[\mathcal{D}'] = \boldsymbol{A}\boldsymbol{Q}\boldsymbol{A}^\top$$

where $\mathcal{D}' = \{\boldsymbol{x}'_1, \ldots, \boldsymbol{x}'_N\}$