Maximum entropy distribution on elliptical regions under mean value constraints.

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Using variational methods we determine the maximum entropy distribution with support on an elliptical region under mean value constraints. More precisely, we determine the probability density function, f_{XY}, of a random vector (X, Y) such that $\mathcal{I}m(X, Y) \subset \mathcal{E}$, where $\mathcal{E} = \{(x, y) \in \mathbb{R}^2 : \frac{x^2}{a^2} + \frac{y^2}{b^2} < 1\}$, that maximizes the entropy functional $f \rightsquigarrow -\int_{\mathcal{E}} f \ln f \mathrm{d}\ell$ and satisfies the mean value constraints $\mathbb{E}X = \mu_X$ and $\mathbb{E}Y = \mu_Y$, where μ_X and μ_Y, such that $(\mu_X, \mu_Y) \in \mathcal{E}$, are given.