Why

Result

Proposition 1. *Let* $x : \Omega \to \mathbf{R}^d$ *be a normally distributed random variable on a probability space* $(\Omega, \mathcal{A}, \mathbf{P})$ *with mean* $\mu \in \mathbf{R}^d$ *and covariance* $\Sigma \succ 0$. *Let* $g : \mathbf{R}^d \to \mathbf{R}$ *be the density of* x. *Then the entropy of* x *is*

$$h(g) = - \int g \log g = \frac{1}{2} \log((2\pi e)^d \det \Sigma)$$

This result tells us the *multivariate normal entropy* or *Gaussian entropy*.