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*.