Normal Densities

1 Why

We want a density that is symmetric about some central value with some spread.

2 Definition

Let $f : \mathbf{R} \to \mathbf{R}$ be a density. If there exists $\mu \in \mathbf{R}$ and $\sigma \in \mathbf{R}$ with $\sigma > 0$ so that for each $x \in \mathbf{R}$

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left(-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right)$$

then f is a *gaussian density*.