

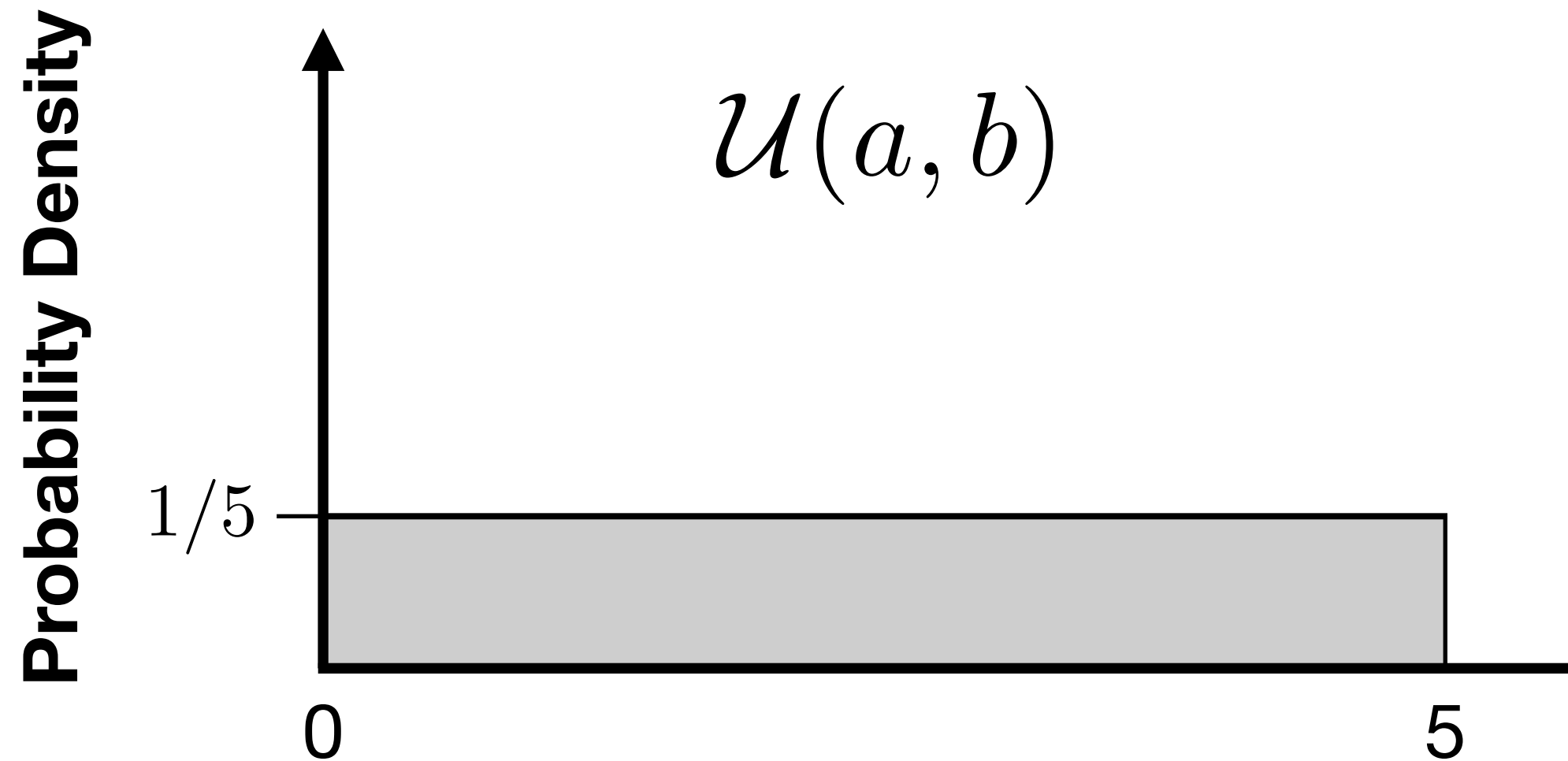
Differences Between Discrete and Continuous Distributions

- Probability masses in discrete distributions sum to 1, while probability densities in continuous distributions integrate to 1.
- Probability densities can be greater than 1 (yet they can still integrate to 1).
- The probability mass of any precise value (e.g., 1.000...) in a continuous distribution is always infinitely small.

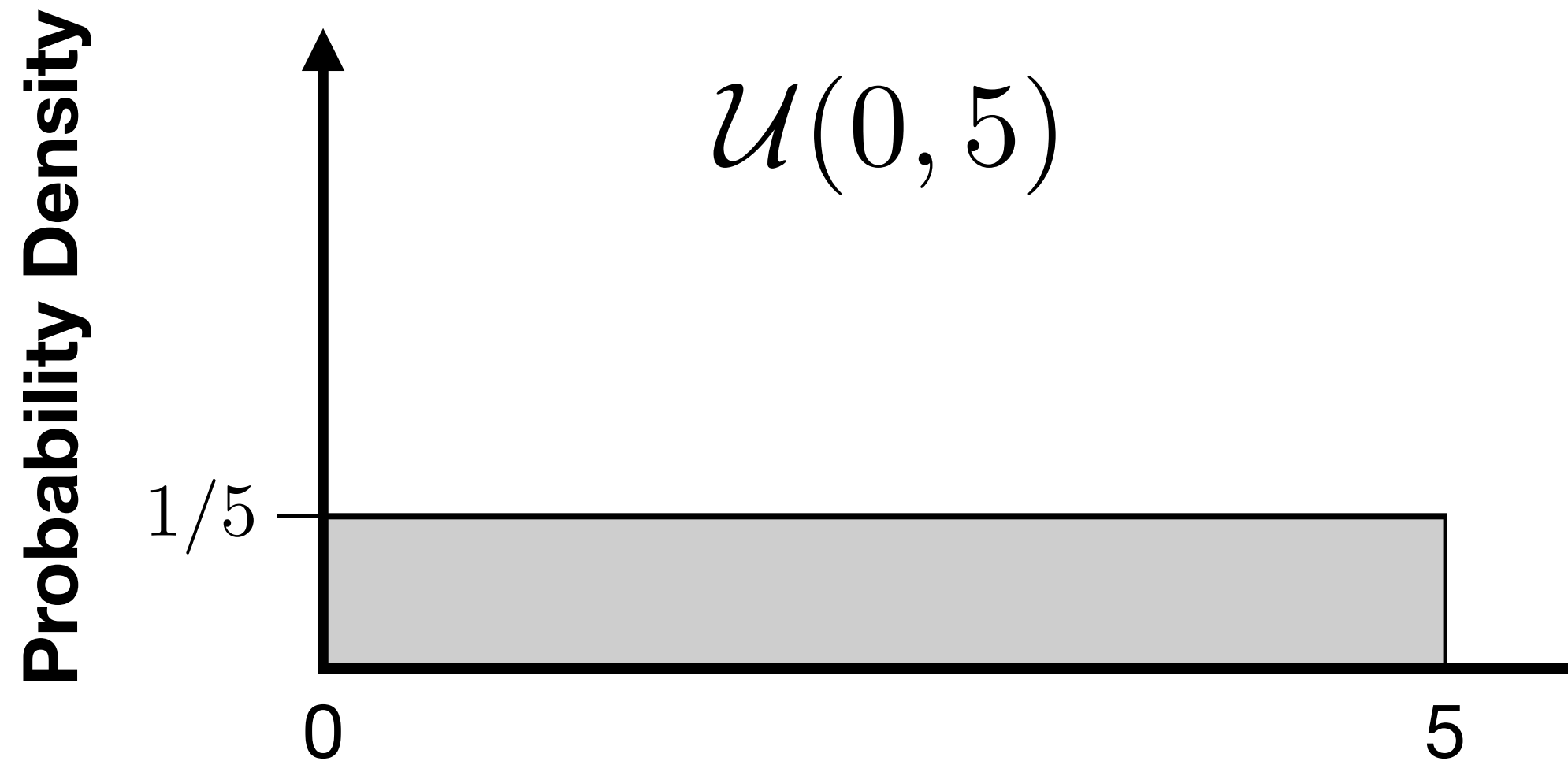
Continuous Uniform Distribution



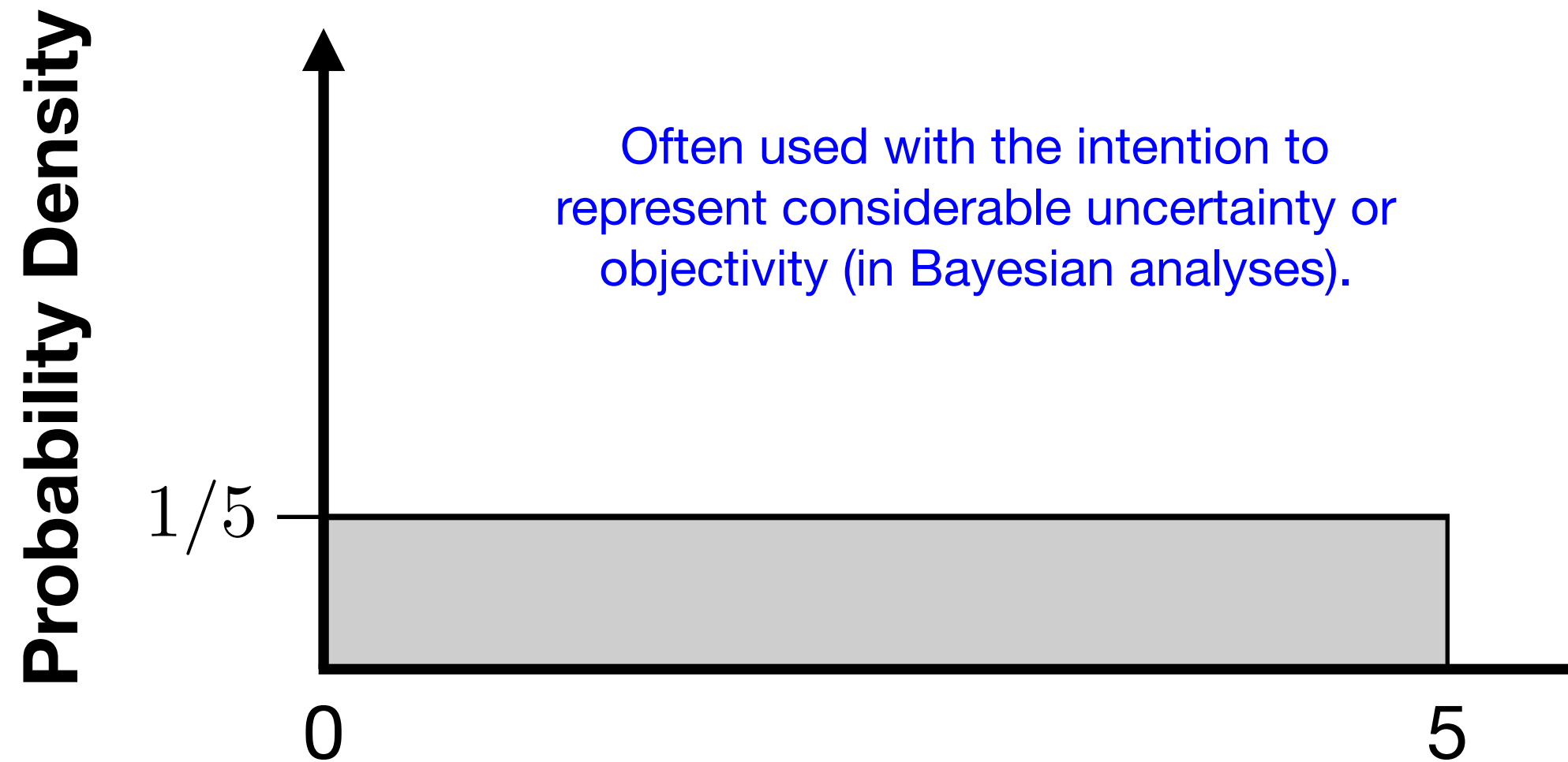
Continuous Uniform Distribution



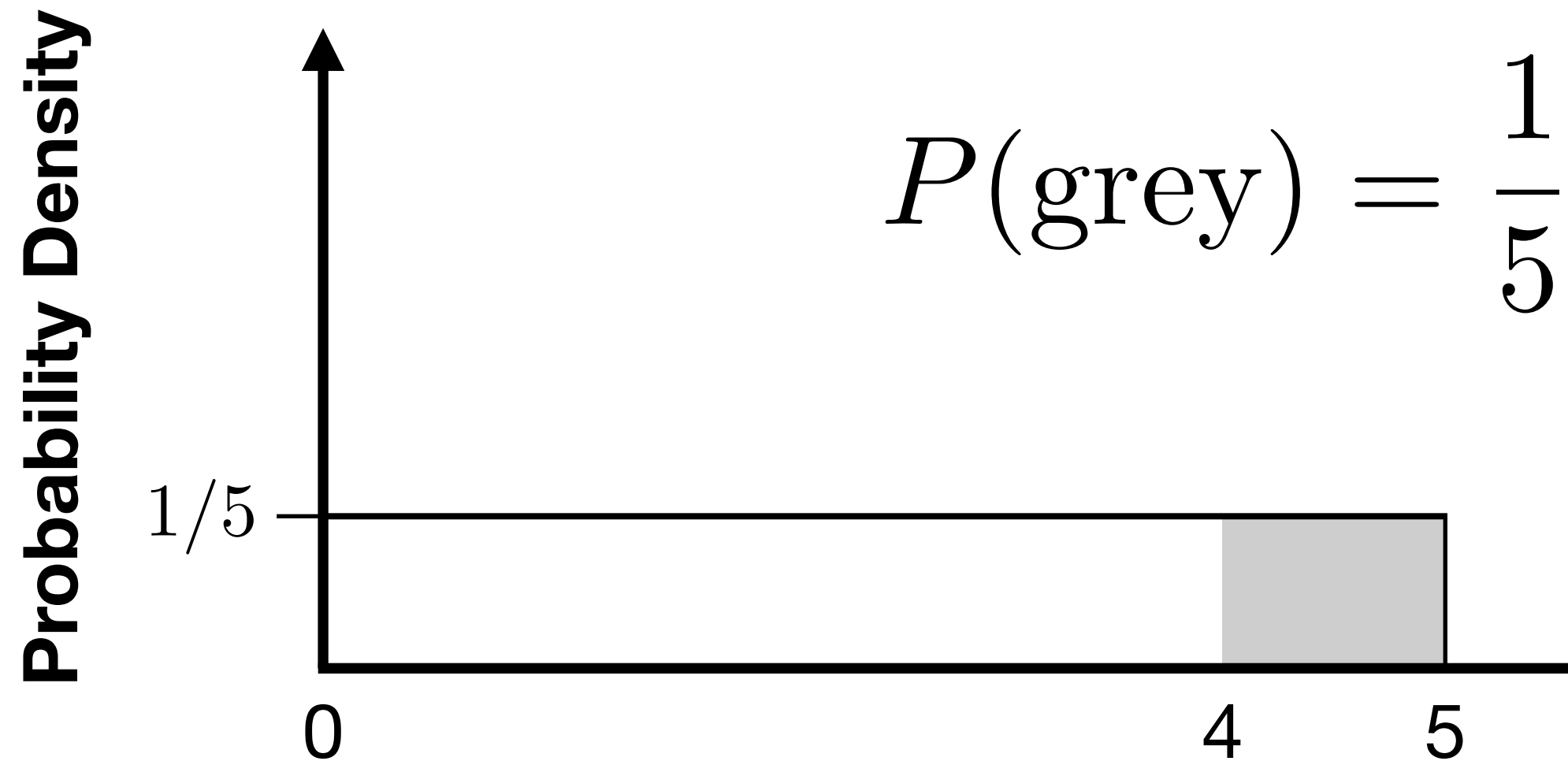
Continuous Uniform Distribution



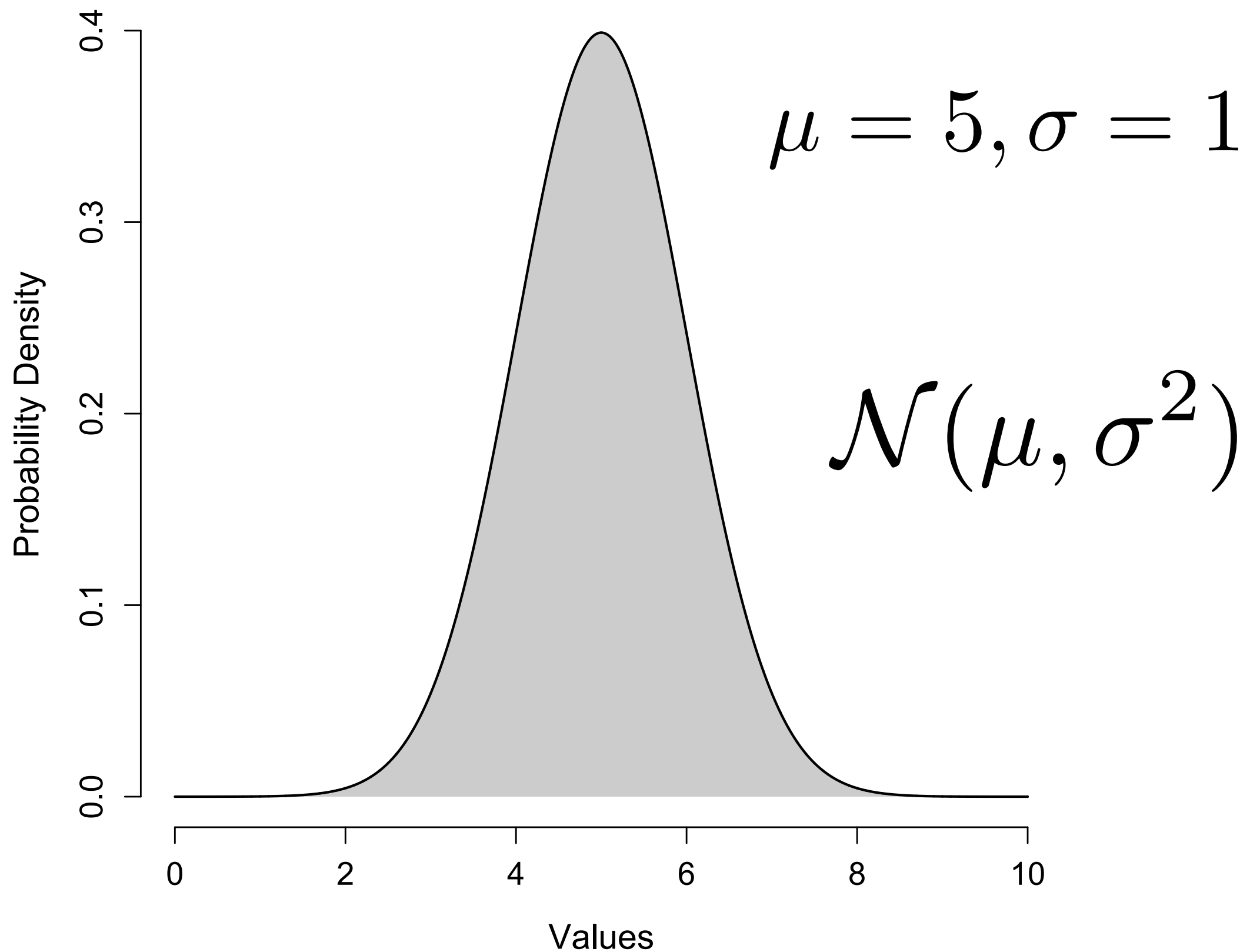
Continuous Uniform Distribution



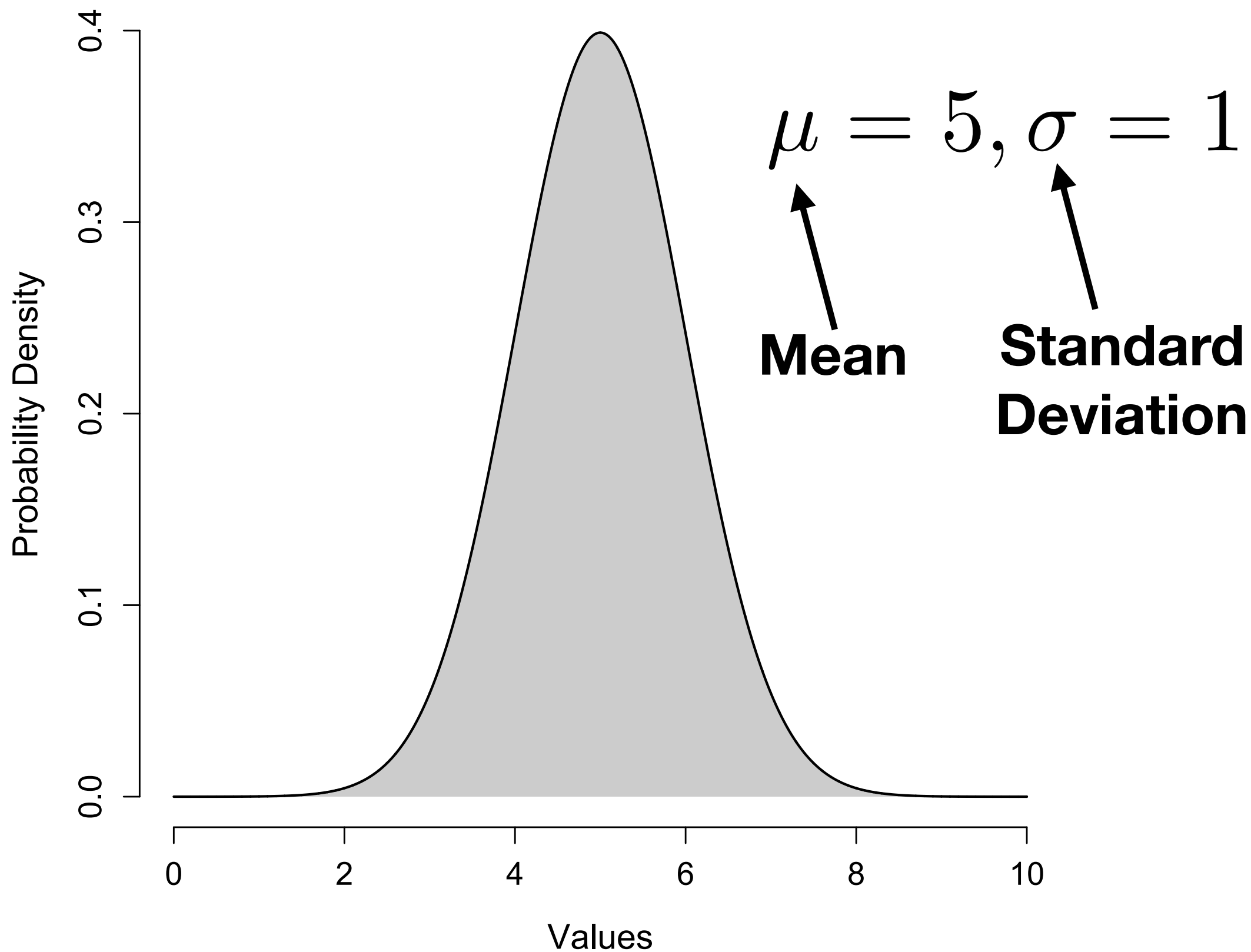
Continuous Uniform Distribution



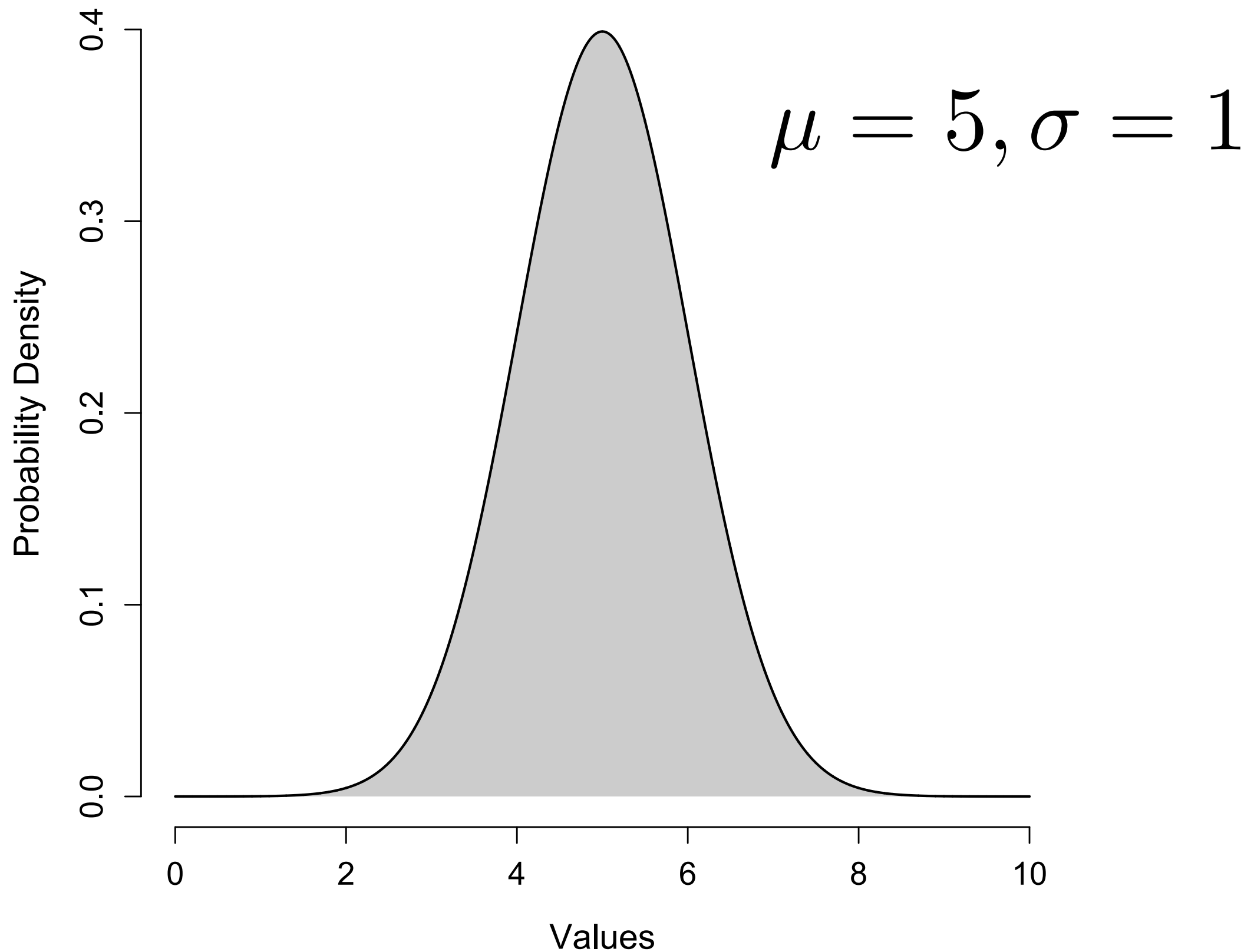
Normal Distribution



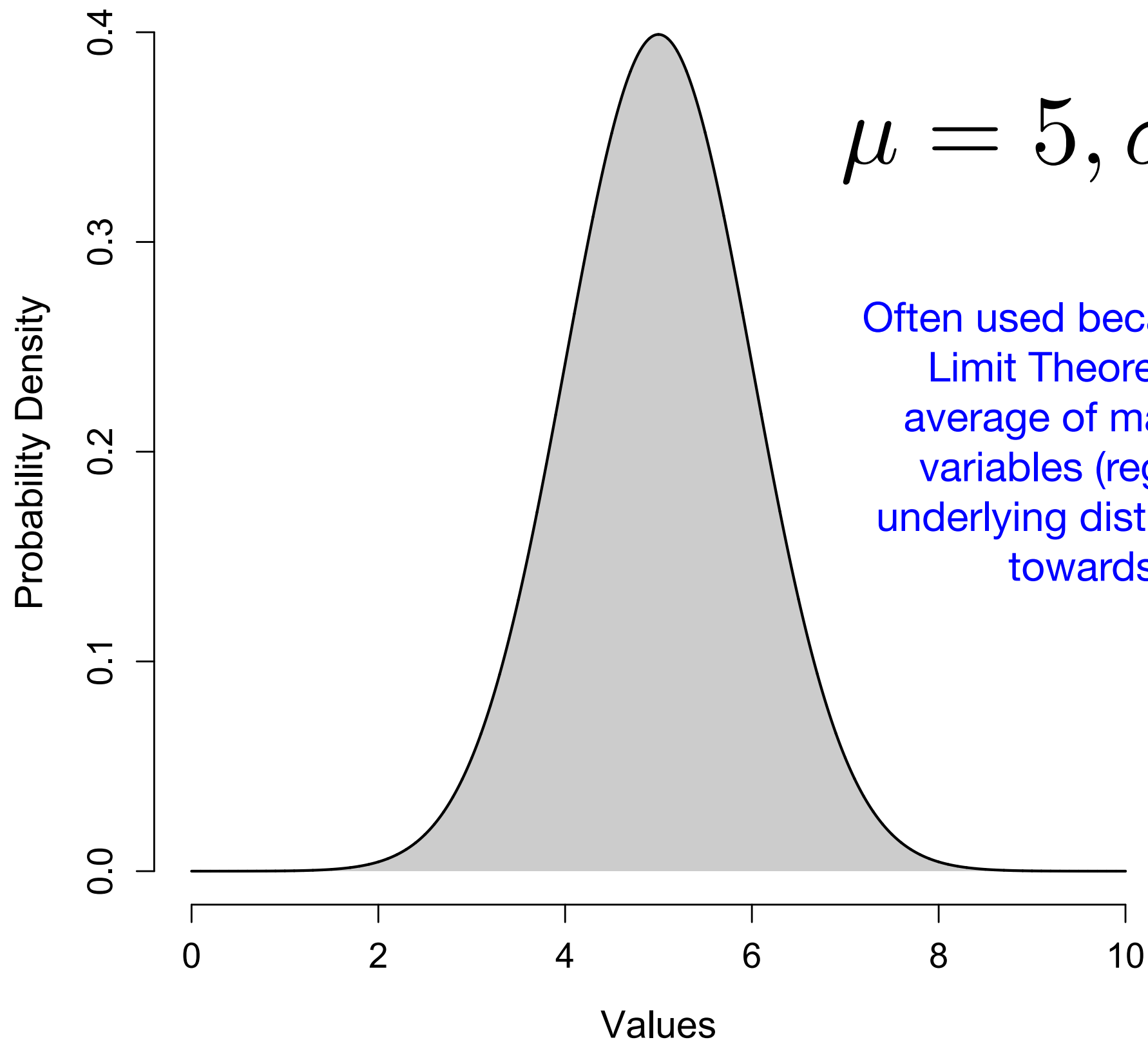
Normal Distribution



Normal Distribution



Normal Distribution



$$\mu = 5, \sigma = 1$$

Often used because of the Central Limit Theorem - the sum or average of many independent variables (regardless of their underlying distributions) will tend towards a Normal.

Variance

Variance is the expectation of the squared deviation of a random variable from its mean.

$$\text{Var}(X) = \sigma^2(X) = \text{E}[(X - \mu)^2]$$

Variance (Standard Deviation)

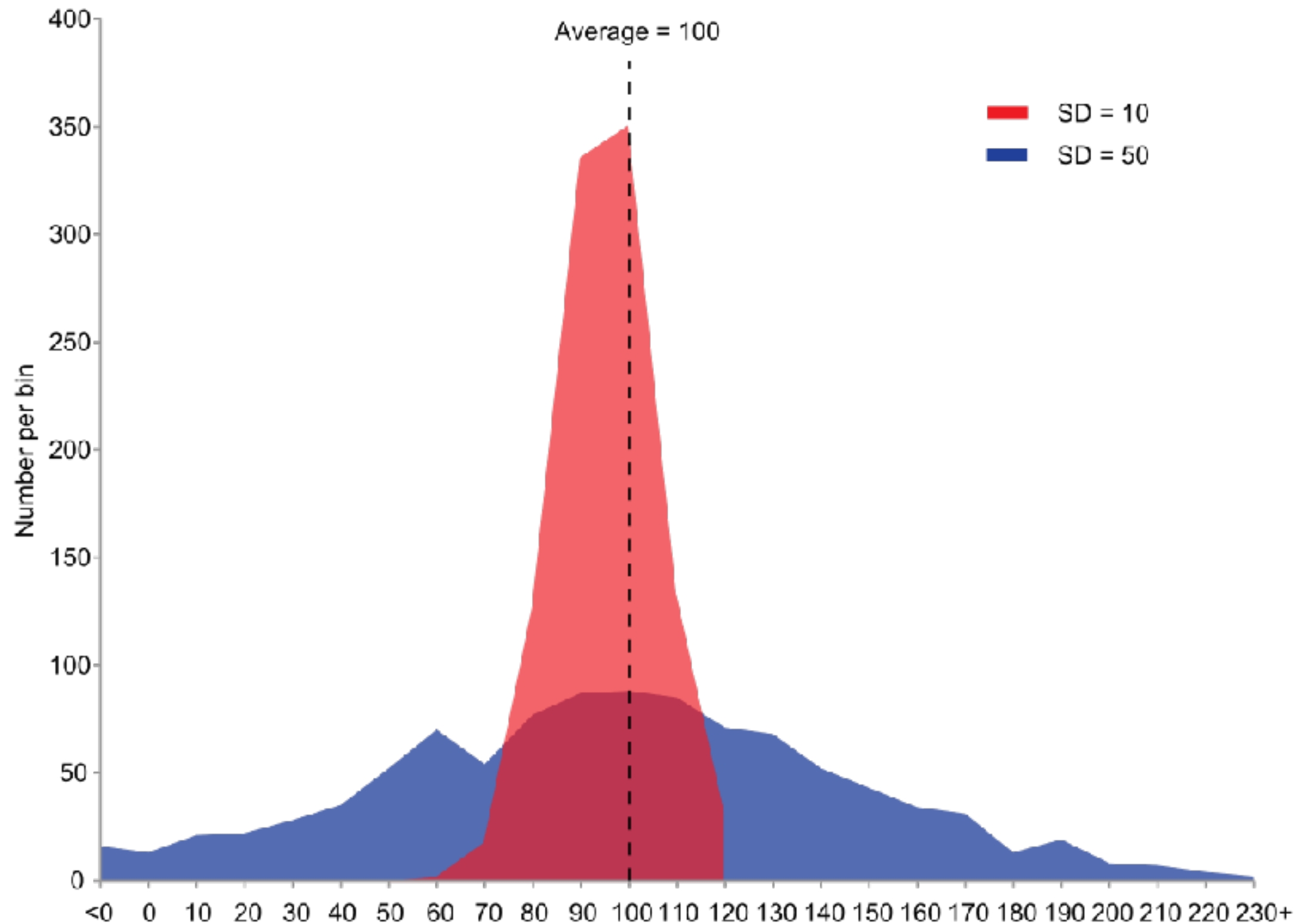
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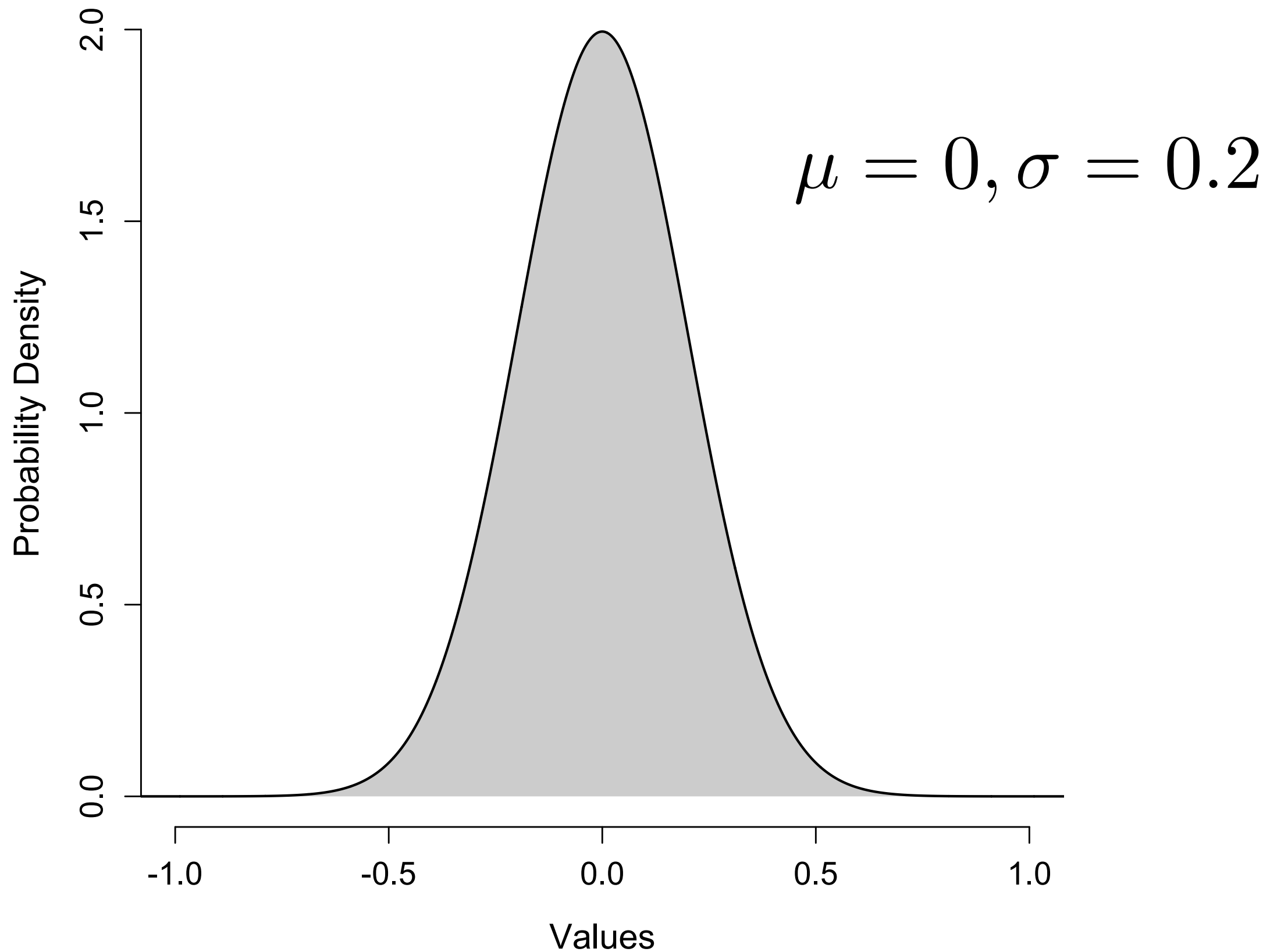
The standard deviation of a random variable is the square root of its variance.

$$\text{sd}(X) = \sigma(X) = \sqrt{\text{E}[(X - \mu)^2]}$$

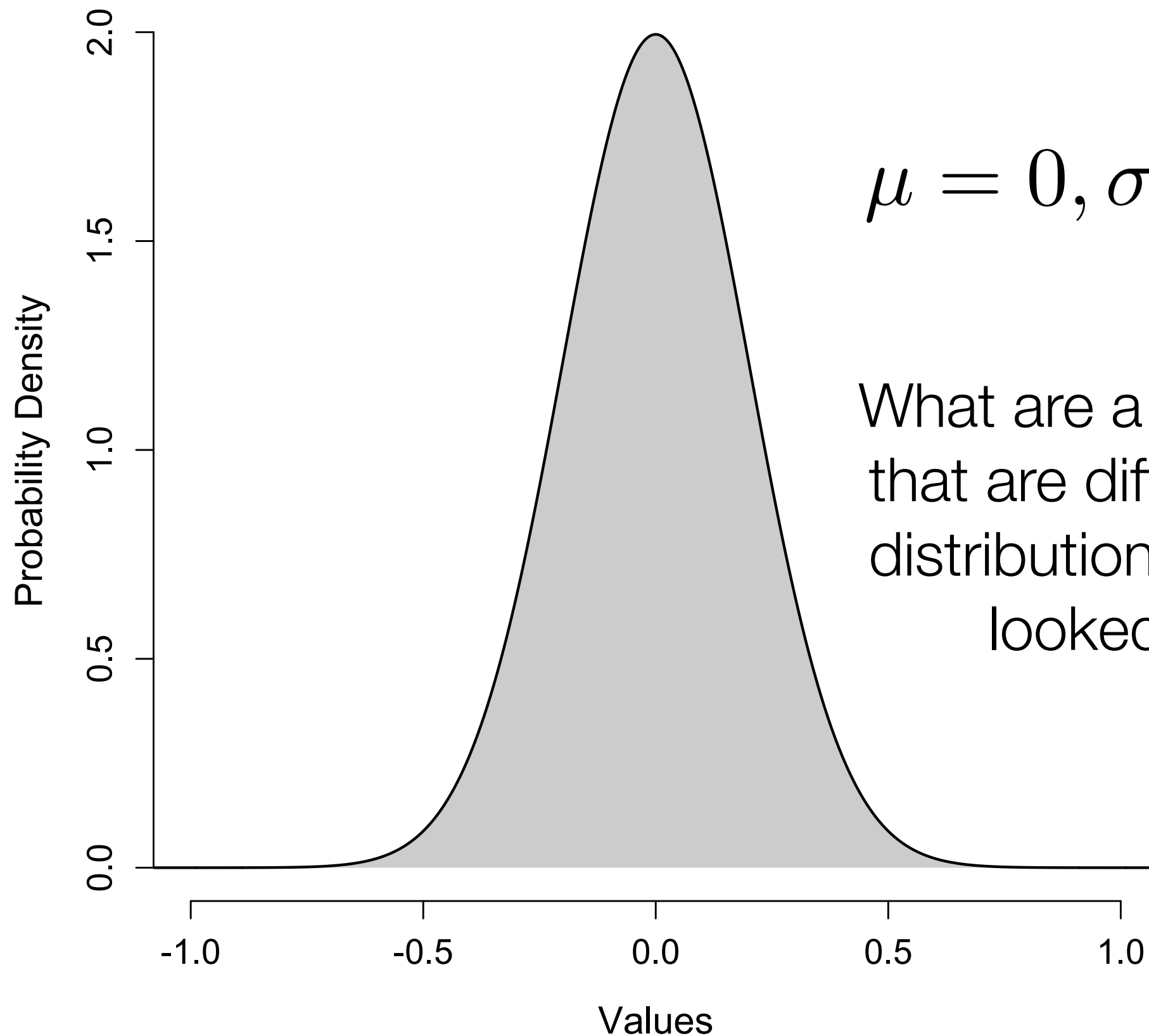
Standard Deviation / Variance



Normal Distribution



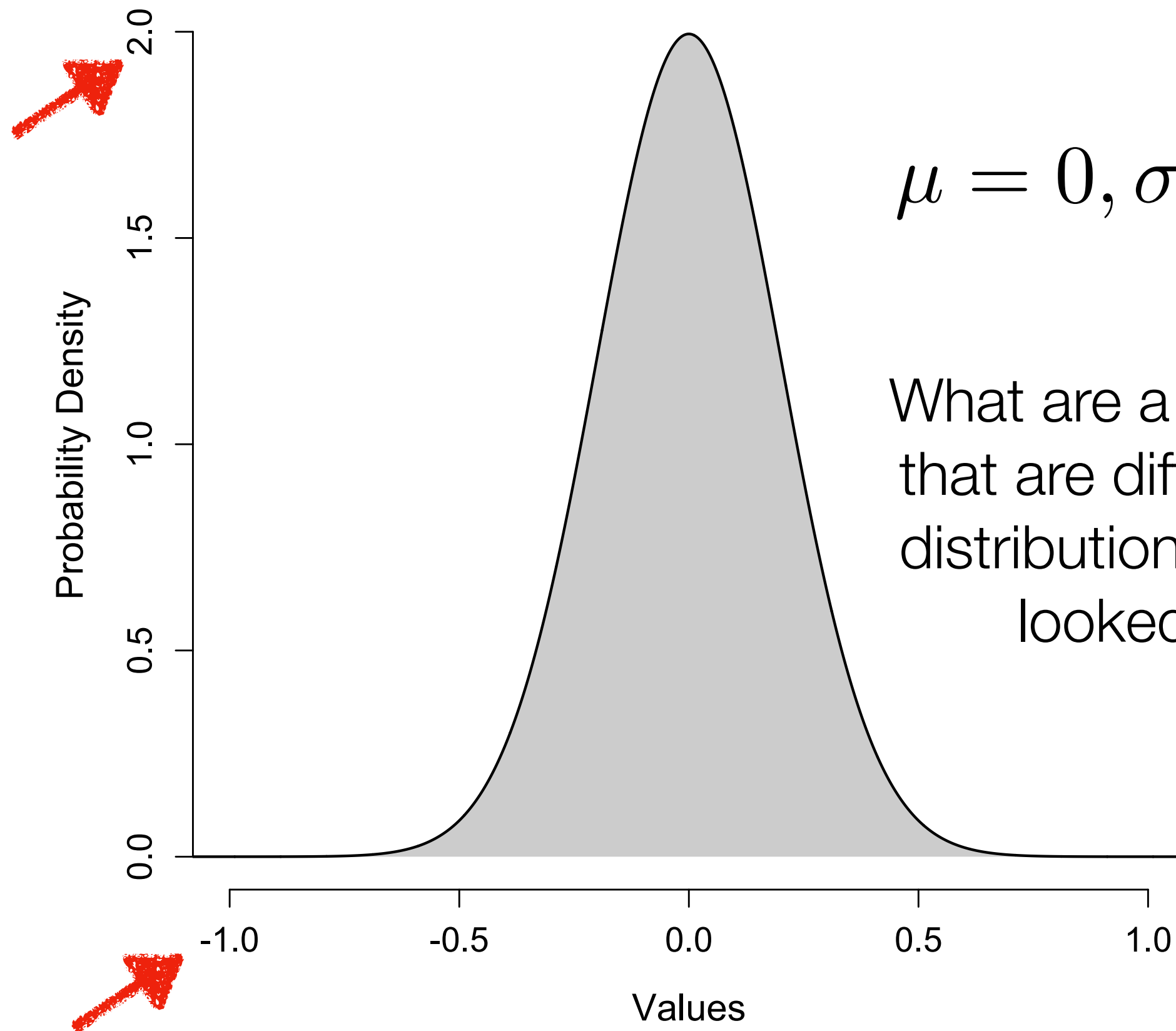
Normal Distribution



$$\mu = 0, \sigma = 0.2$$

What are a couple of things that are different about this distribution than any we've looked at before?

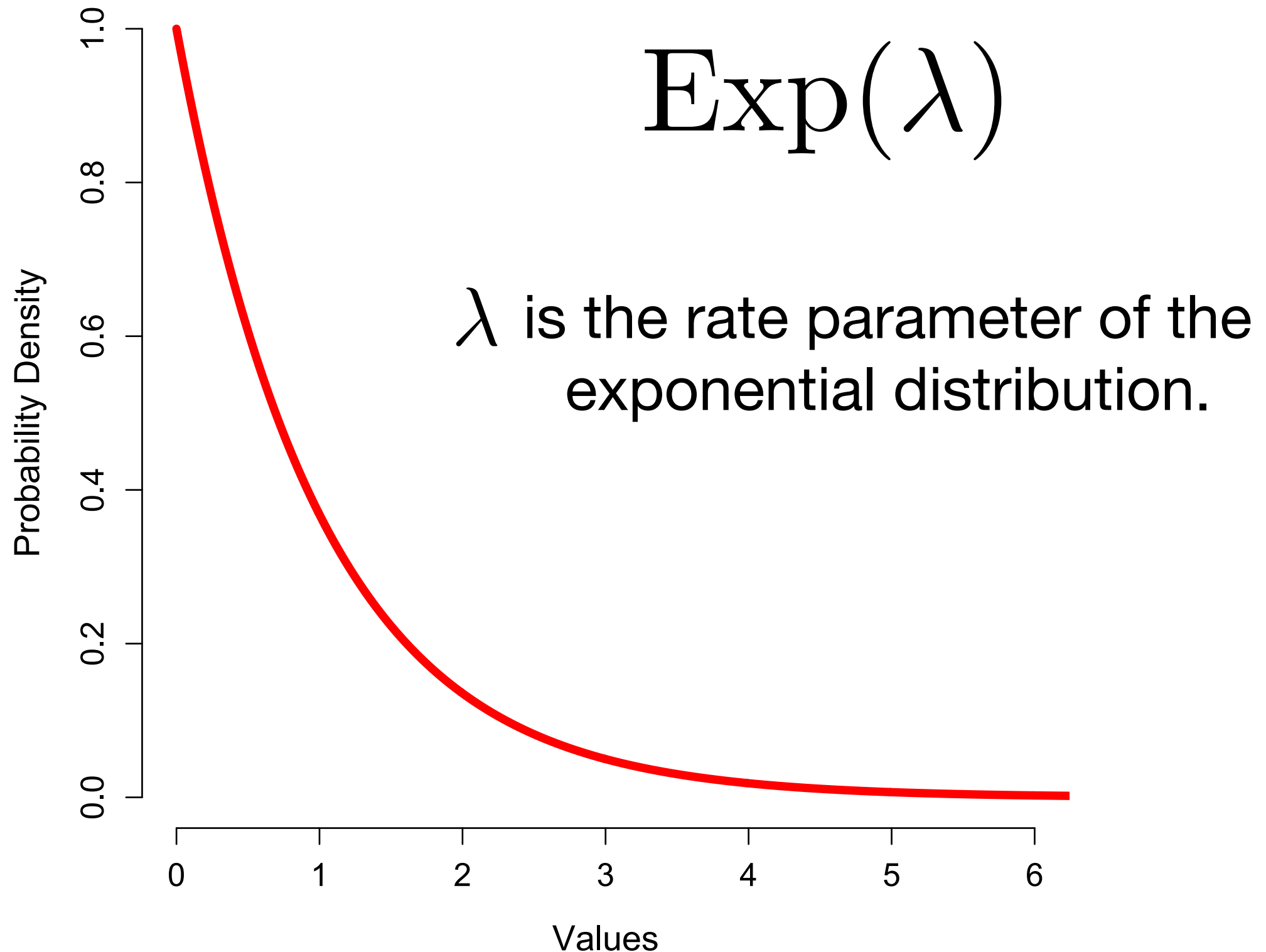
Normal Distribution



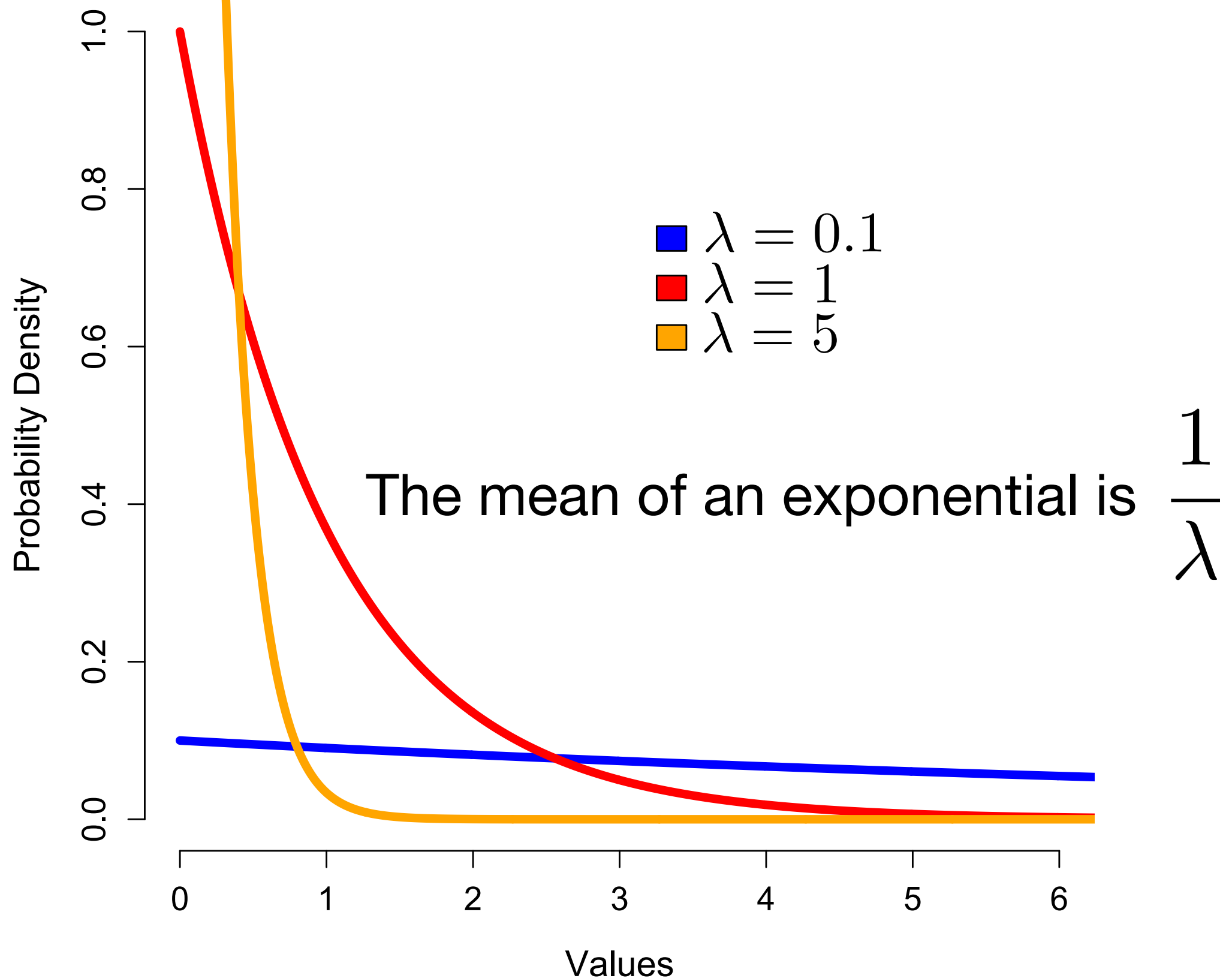
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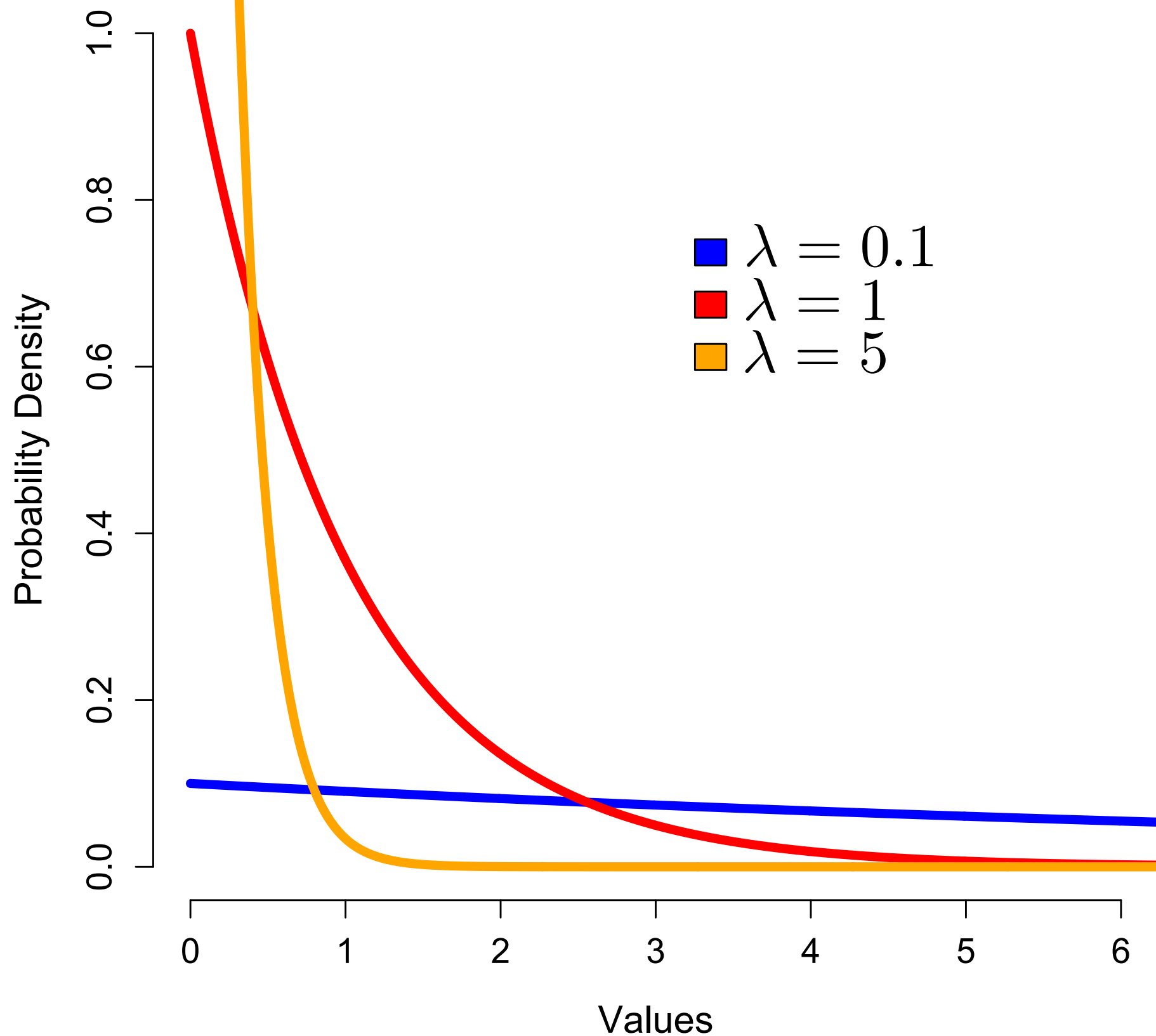
Exponential Distribution



Exponential Distribution



Exponential Distribution



Exponential Distribution

