CONTINUOUS RANDOM VARIABLES AND DISTRIBUTIONS

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DEFINITON

A **continuous random variable** can take all values in some interval of numbers. Thus, it has infinite possible values.

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Probability density function

The probability distribution of a continuous variable X is described by a **probability density function** (pdf) $f(x)$.

- $f(x)$ represent the height of the curve at x.
- The probability of any event $a \leq X \leq b$ is the area under the pdf between a and b:

$$P(a \leq X \leq b) = \int_a^b f(x)dx$$

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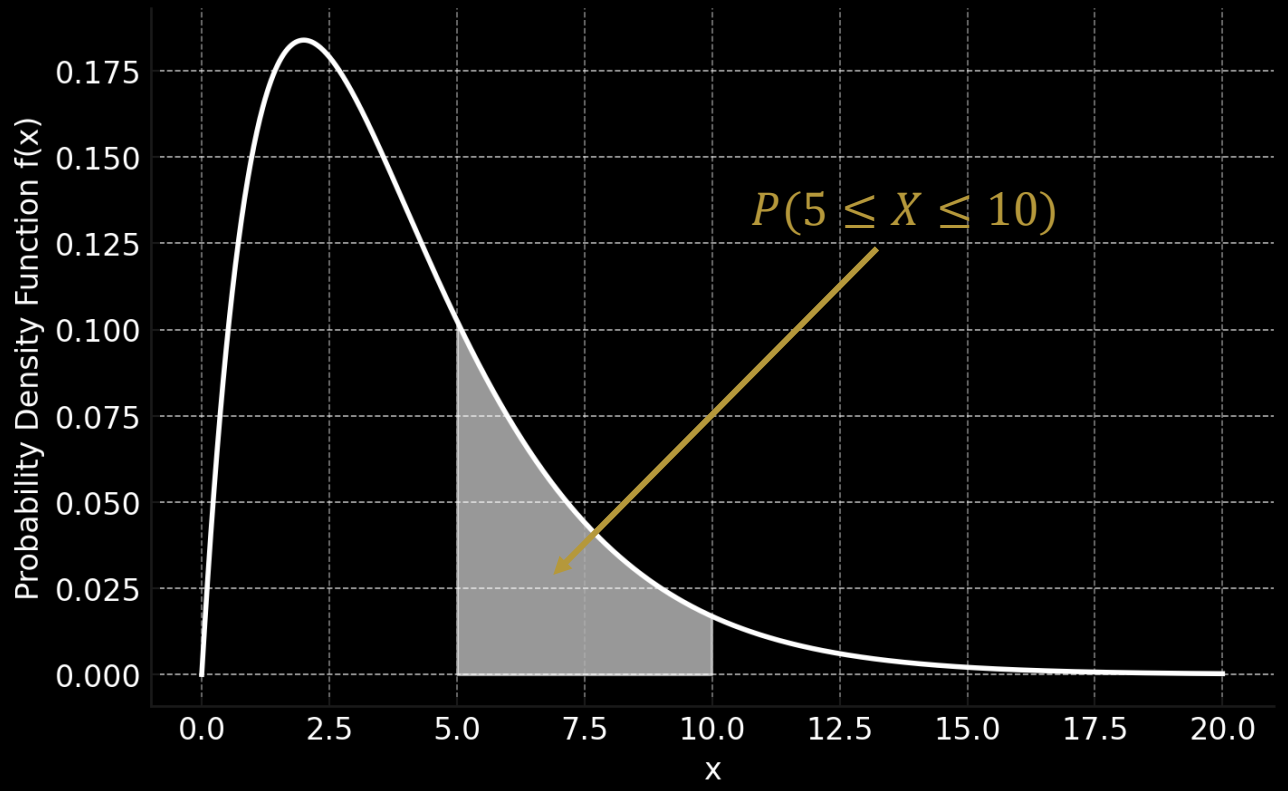
Probabilities



$P(X = a) = 0$ for all values a.

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Properties of a pdf

A probability density function must satisfy:

- $f(x) \geq 0$ for all x
- The area under the entire curve is 1: $\int_{-\infty}^{\infty} f(x)dx = 1$

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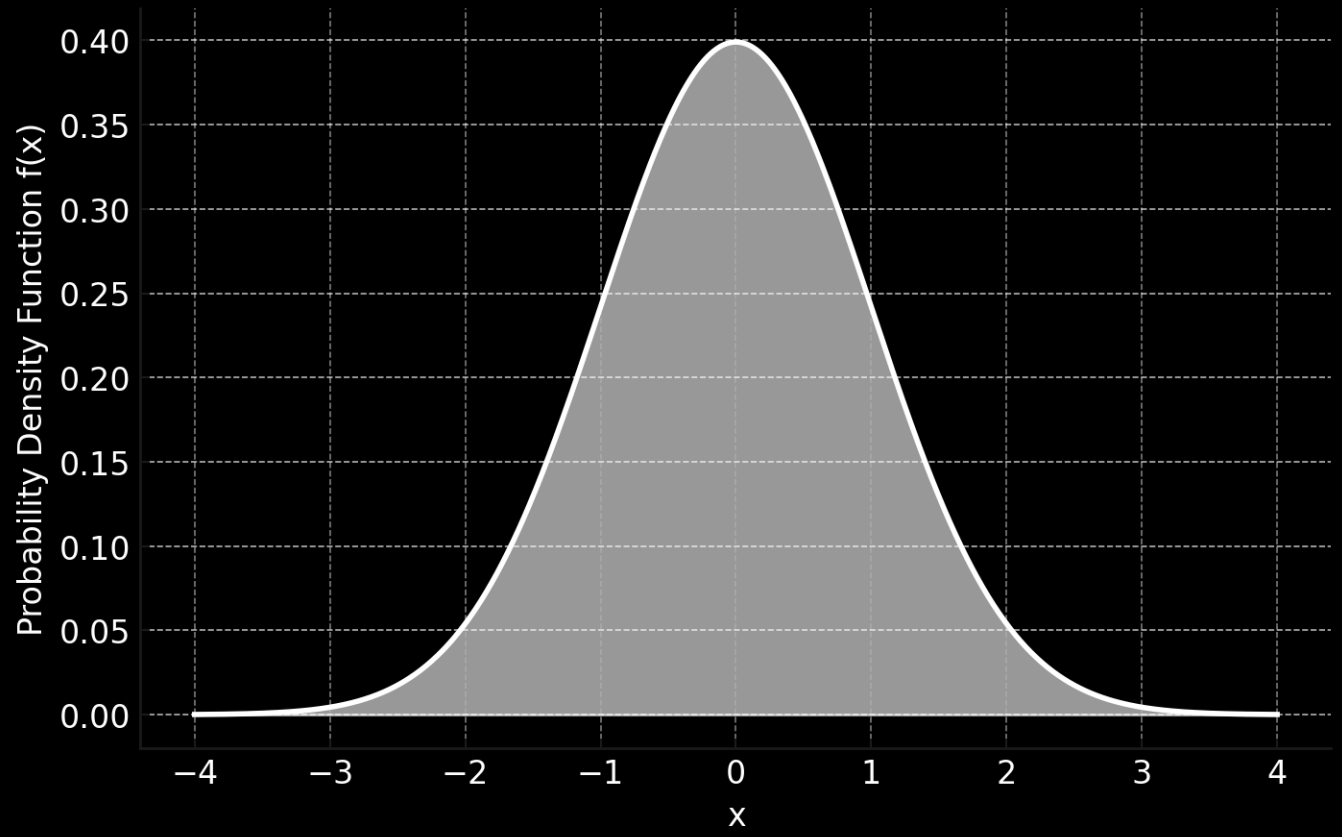
Normal distribution



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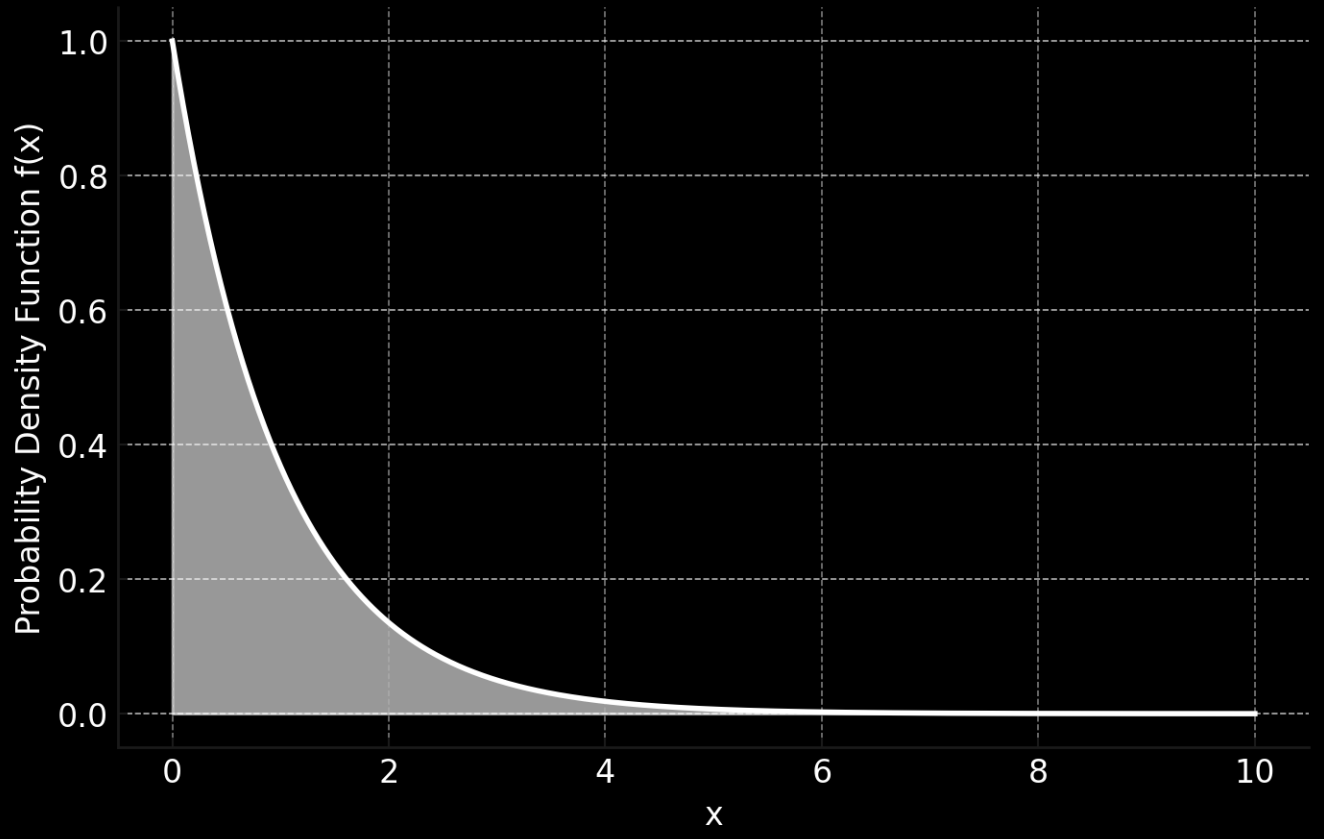
Exponential distribution



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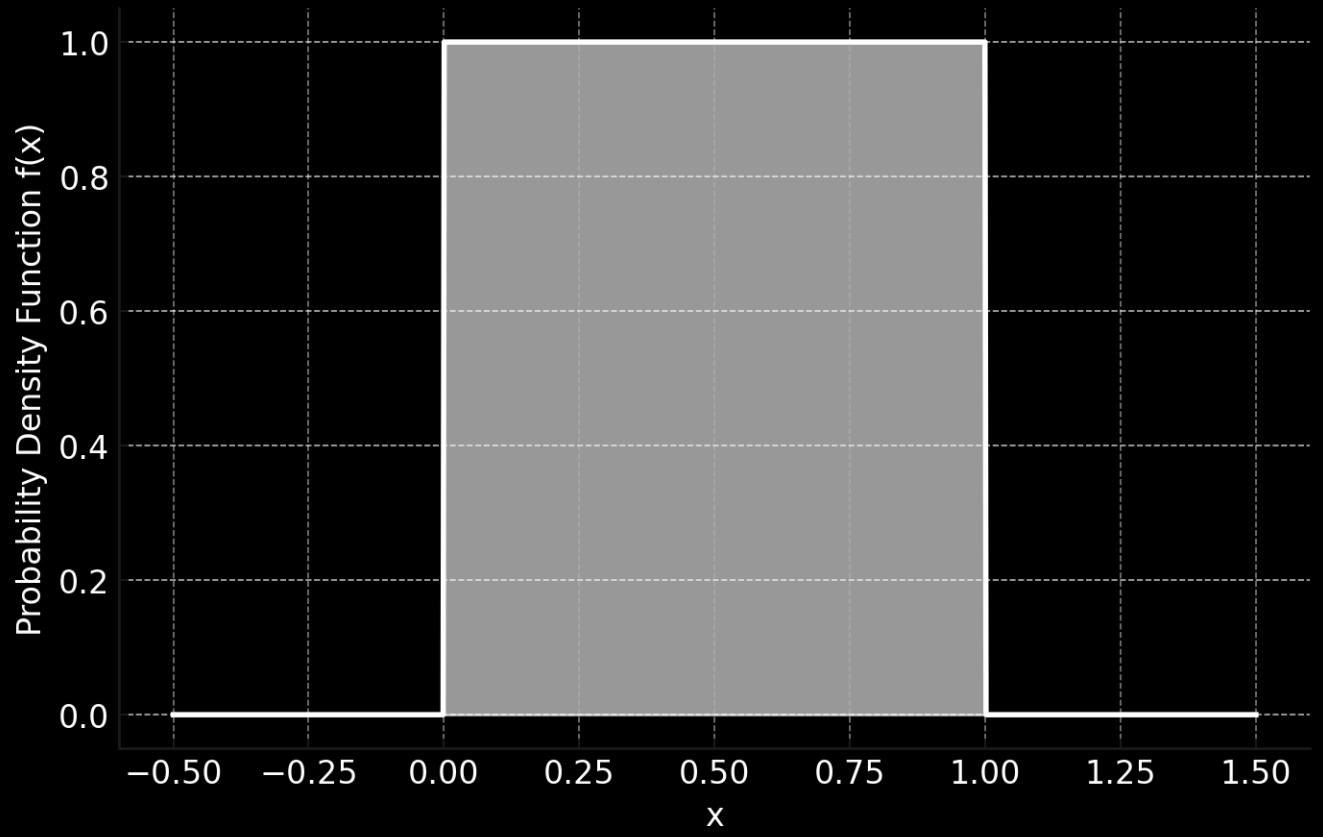
Uniform distribution



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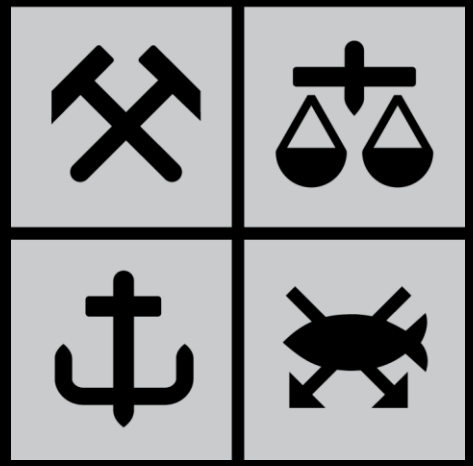

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