continuous random variables

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A continuous random variable is one that takes values over a continuous range: the whole real line; an interval on the real line, perhaps infinite; or a disjoint union of such intervals.

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A continuous random variable X must have the property that no possible value has positive probability:

$$P(X = x) = 0 \text{ for all } x \in \mathbb{R}$$

probability density function

For any PDF we know that $f(x) \geq 0$ for all values of x and the total area under the whole graph is 1

$$\int_{-\infty}^{\infty} f(x)dx = 1$$

Note: $P(a \leq X \leq b) = P(a < X \leq b) = P(a \leq X < b) = P(a < x < b)$