PROBABILITY DISTRIBUTIONS

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- Suppose $(\mathbb{X}, \mathscr{F})$ is a measureable space

- $\mathscr{P}(\mathbb{X})$ be the space of probability distributions over $\mathbb{X}$

- Given a probability distribution $\mu \in \mathscr{P}(\mathbb{X})$, we will assume there is a density over $\mathrm{d}x$

$$\mu(\mathrm{d}x) = \mu(x)\mathrm{d}x$$

- Define the product measure $\mu_1 \otimes \mu_2 \in \mathscr{P}(\mathbb{X} \times \mathbb{X})$

$$\mu \otimes \mu'(\mathrm{d}x, \mathrm{d}x') = \mu(\mathrm{d}x)\mu'(\mathrm{d}x') = \mu(x)\mu'(x')\mathrm{d}x\mathrm{d}x'$$

- E.g. when $\mathbb{X} = \{x_1, \ldots, x_n\}$ is discrete we can represent μ as a n-dimensional row vectors with i-th entry $\mu(x_i)$

- Given $\mu, \mu' \in \mathscr{P}(\mathbb{X})$ with $\mu(\mathrm{d}x) = \mu(x)\mathrm{d}x$ and $\mu'(\mathrm{d}x) = \mu'(x)\mathrm{d}x$:

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FUNCTIONS