- i.i.d means:

  Same support

  Same distribution (this could mean different frequencies)

- Property of expected value and i.i.d:

$$E(g(x_1)) = E(g(x_2))$$

where: g is arbitrary function; x_1, x_2 are i.i.d

Proof ~~for~~ discrete case:

$$E(X_1) = \sum x_1 \cdot P(X_1 = x_1)$$

$$\Leftrightarrow E(g(X_1)) = \sum g(x_1) P(X_1 = x_1) \quad \text{< LOTUS >}$$

$$= \sum g(x_2) P(X_2 = x_2) \quad \text{< } X_1, X_2 \text{ are i.i.d >}$$

$$= E(g(X_2))$$

↳ same support
. same PMF

- True loss can be written in many ways, some are:

$$L_D(h) = E(1_{h(x) \neq Y})$$

$$L_D(h) = E_{(x,y)\sim D}(1_{h(x) \neq y})$$

$$L_D(h) = \underset{x}{E}\left[\underset{y}{E}(1_{h(x) \neq Y} \mid X = x)\right]$$

$$L_D(h) = P(\{h(X) \neq Y\})$$