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## GENERAL FACTS ABOUT CONTINUOUS R.V.'S

$f: \mathbb{R} \rightarrow \mathbb{R}$  is the probability density function

Recall that:

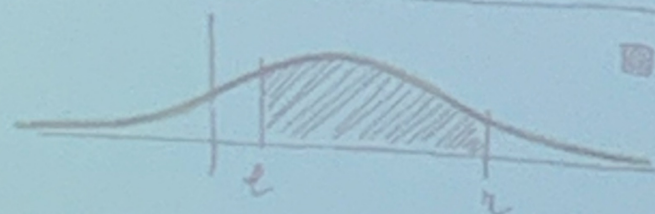
a)  $f(x) \geq 0 \quad \forall x \in \mathbb{R}$

b)  $f$  is integrable on any interval.

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

### 1) CONNECTION BETWEEN $f$ and the PROBABILITIES

$$\boxed{P[X \in (l, r)] = \int_l^r f(x) dx} \quad l < r.$$



$$\blacksquare = P[X \in (l, r)]$$

### 2) EXPECTATION

$$\boxed{E[X] \stackrel{\text{Def}}{=} \int_{-\infty}^{+\infty} x f(x) dx.} \quad \begin{array}{l} \text{(whenever the} \\ \text{integral makes} \\ \text{sense)} \end{array}$$

SUPPORT of  $f$

If  $f(x) = 0$  outside  $[a, b]$ , then

$$E[X] = \int_a^b x f(x) dx$$