The decision version

\[ p = \{ S: \exists \text{ poly-the } A \text{ s.t. } A(x) = 1 \forall x \in S \} \]

\[ NP = \{ S: \exists \text{ poly } \exists \text{ eff. verif. procedure } V \text{ s.t. } \forall x \exists w: V(x,w) = 1 \}
\]

Witness (complete) \( \forall x \exists w: V(x,w) = 1 \)
Witness (sound) \( \forall x \exists w: V(x,w) = 1 \Rightarrow w \in L \)

When \( L = \emptyset \Rightarrow p = \text{NP} \Rightarrow \text{NP} = \emptyset \)

The P vs NP question as \( PC \in \text{P} \) ? REPF any \( PC = R \) given

Also \( \text{REPF} \) known

\[ PF \neq PC: R = \{ (x_i, y_i) \in \mathbb{R} \text{ s.t. } f(x_i) = y_i \} \]

\[ f = \min(f(x)) \]