Let  $E=\mathbb{Z}, nRp \iff p-n=2k, k\in\mathbb{Z}.$  Proove that R is an equivalence relation.

$$\begin{array}{l} p-n=2k, k\in \mathbb{Z} \\ \Rightarrow n-p=2j \mid j=-k, j\in \mathbb{Z} \\ \Rightarrow nRp \iff pRn \end{array}$$

$$\begin{split} p-n &= 2k \text{ and } p-l = 2j, (j,k) \in \mathbb{Z} \\ \Rightarrow l-n &= 2(j-k), (j-k) \in \mathbb{Z} \\ \Rightarrow pRn \text{ and } pRl \Rightarrow nRl \end{split}$$

$$\begin{aligned} n-n &= 0, 2\|0\\ \Rightarrow nRn \end{aligned}$$