

Show that when $\mathbb{E}|X|$, $\mathbb{E}|Y|$ and $\mathbb{E}|XY|$ are finite, each of the following statements implies the next one, and give examples with $X, Y \in \{-1, 0, 1\}$ a. s. that show the reverse implications are false: (i) X and Y are independent; (ii) $\mathbb{E}(Y|X) = \mathbb{E}Y$; (iii) $\mathbb{E}(XY) = \mathbb{E}X\mathbb{E}Y$.