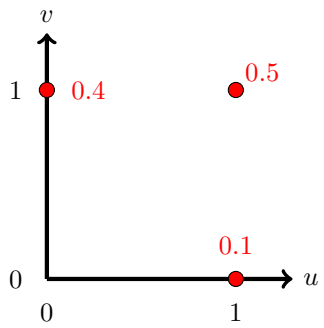
Let X and Y be binary random variables on sample space $S = \{a, b, c, d\}$, defined by

$$X(u) = \begin{cases} 1 & \text{if } u \in \{a, b, c\} \\ 0 & \text{else} \end{cases} \qquad Y(u) = \begin{cases} 1 & \text{if } u \in \{b, c, d\} \\ 0 & \text{else} \end{cases}$$

and whose joint probability mass function $p_{X,Y}(u, v)$ is shown below:



If $P(\{b\}) = 0.2$, then which of the following must be true?

(a) $P(\{a\}) = 0.1, P(\{c\}) = 0.3, P(\{d\}) = 0.4$

(b) $P(\{a\}) = 0.1, P(\{c\}) = 0.4, P(\{d\}) = 0.3$

(c) $P(\{a\}) = 0.3, P(\{c\}) = 0.1, P(\{d\}) = 0.4$

(d) $P(\{a\}) = 0.3, P(\{c\}) = 0.4, P(\{d\}) = 0.1$

(e) $P(\{a\}) = 0.4, P(\{c\}) = 0.3, P(\{d\}) = 0.1$

(f) $P(\{a\}) = 0.4, P(\{c\}) = 0.1, P(\{d\}) = 0.3$

(g) $P(\{a\}) = 0$

(h) $P(\{c\}) = 0$

(i) $P(\{d\}) = 0$

(j) None of these