Question:A student says that if you throw a die, it will show up 1 or not 1. Therefore, the probability of getting 1 and the probability of getting 'not 1' each is equal to $\frac{1}{2}$. Is this correct? Give reasons.

Solution:

Let

$$p_X(k) = \begin{cases} \frac{1}{6}, & 1 \le X \le 6 \\ 0, & \text{otherwise} \end{cases} \tag{1}$$

$$\begin{aligned} \Pr(X \neq 1) &= 1 - \Pr(X = 1) && (2)\\ &= 1 - p_X(1) && (3)\\ &= 1 - \frac{1}{6} && (4)\\ &= \frac{5}{6} && (5) \end{aligned}$$

$$\implies \Pr(X \neq 1) \neq \Pr(X = 1) \tag{6}$$

Since, $\Pr(X = 1)$ and $\Pr(X \neq 1)$ are not equal.

$\therefore$ The given statement is not true.