

The statement given is false.

Let's consider such example:

A is a random variable that equals to 0 with probability 1:

$$P(A = 0) = 1$$

B is a standard normally distributed variable:

$$B \sim N(0,1)$$

Then

$AB = 0$  with probability 1, so AB is degenerate random variable. But B is not degenerate.

So the given statement is false.