

Outcomes with probability 0 can be discarded when working with discrete random variables.

Example: Flip a coin until 1st head appears

$$S = \{ H, TH, TTH, TTTT, \dots, \underbrace{TTT \dots T}_{j-1} H, \dots, TTTT \dots \}$$

\downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow
 yields $X=1$ $X=2$ $X=3$ $X=4$ \dots $X=j$ \dots

if $X = \#$ of flips needed

$\left. \begin{matrix} \dots \\ \dots \\ \dots \end{matrix} \right\}$
 $X = ???$
 ~~$X = ??$~~ not
 real
 number.

(1) assign another value to $X(TTT \dots) = 7$
 because $P(\{TTT \dots\}) = 0$ this will not affect
 any of your probability
 calculations

(2) ignore that outcome.

Either solution should be OK when dealing with discrete random variables,
 at this level of sophistication.