Probability & Random Variables
AI1110

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Question

I toss three coins together. The possible outcomes are no heads, 1 head, 2 heads and 3 heads. So, I say that probability of no heads is 1/4 . What is wrong with this conclusion?

Solution

$\implies$ Assuming the coin tosses to be independent

The narrator of the Question has concluded that the probability of the no heads(zero heads) is $\frac{1}{4}$, by assuming that it is one of the four posibilities :
{no heads, 1 head, 2 heads and 3 heads}
But his/her assumtion is wrong because it does not cover the entire sample space of three coin tosses.
Let P be the probability of no heads in the outcome.
To find the probability of no heads we need to find out the sample space of three coin tosses.
That is :
$\{HHH, HHT, HTH, THH, TTT, TTH, THT, HTT\}$
$\implies$ Probability of no heads = $\frac{\text{number of outcomes with no head}}{\text{total number outcomes}}$
$\implies$ P = $\frac{1}{8}$