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

$\implies$ Let the coin be fair.
$\implies$ Random variable X is number of heads
$\implies$ Let getting heads be success
Then $\Pr(X = r) = {}^{n}C_r(\frac{1}{2})^r(1 - \frac{1}{2})^{n-r}$ where r=0, 1, 2, 3
$\Pr(X = r) = {}^{3}C_r(\frac{1}{2})^r$
the probability of no heads in the outcome i.e X = 0 is .
$\Pr(X = 0) = {}^{3}C_0(\frac{1}{2})^3$
$\Pr(X = 0) = (\frac{1}{2})^3$
$\Pr(X = 0) = \frac{1}{8}$
According to the narrator Pr(X = 0) = $\frac{1}{4}$
$\therefore$ The conclusion is wrong .