AI1110 Assignment 2 in LaTeX

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12.13.4.4 Question:

Find the probability distribution of

(i) number of heads in two tosses of a coin.
(ii) number of tails in the simultaneous tosses of three coins.
(iii) number of heads in four tosses of a coin.

Solution:

H : Heads, T : Tails

(i) number of heads in two tosses of a coin.

Let X be the random variable representing the number of heads in two tosses of a fair coin.
Possible outcomes = {HH, HT, TH, TT}. All outcomes are equally likely. Probability of each outcome is $\frac{1}{4}$.
X can take values {0, 1, 2}.

Probability distribution of X:

X	0	1	2
P(X=x)	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{1}{4}$

$=$

X	0	1	2
P(X=x)	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$

(ii) number of tails in the simultaneous tosses of three coins.

Let Y be the random variable representing the number of tails in simultaneous tosses of 3 coins.
There are $2^3 = 8$ possible outcomes, and they are equally likely.
$\therefore$ Probability of each outcome is $\frac{1}{8}$.
Y can take values {0, 1, 2, 3}.

Probability distribution of Y:

Y	0	1	2	3
P(Y=y)	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

(iii) number of heads in four tosses of a coin.

Let Z be the random variable representing the number of heads in four tosses of a coin.
There are $2^4 = 16$ possible outcomes each with probability $\frac{1}{16}$. Z can take values {0, 1, 2, 3, 4}.

Probability distribution of Z:

Z	0	1	2	3	4
P(Z=z)	$\frac{1}{16}$	$\frac{4}{16}$	$\frac{6}{16}$	$\frac{4}{16}$	$\frac{1}{16}$

$=$

Z	0	1	2	3	4
P(Z=z)	$\frac{1}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{16}$

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