Assignment 4

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Download all python codes from

https://github.com/Ganesh−RB/AI1103prob−and−randomvariables/Assignment4/codes

and latex-tikz codes from

https://github.com/Ganesh−RB/AI1103prob−and−randomvariables/Assignment4

1 Problem

CSIR UGC NET EXAM (Dec 2012) Q 51
Suppose $X1, X2, X3, X4$ are i.i.d random variables taking values 1 and -1 with probability $1/2$ each. Then $E\left(X_1 + X_2 + X_3 + X_4\right)^4$ equals

1) 4 2) 76 3) 16 4) 12

2 Solution

$X_i, i \in \{1..4\}$ are i.i.d random variables with

$$\Pr\left(X_i = +1\right) = \frac{1}{2} \tag{2.0.1}$$

$$\Pr\left(X_i = -1\right) = \frac{1}{2} \tag{2.0.2}$$

Let $Y = \left(X_1 + X_2 + X_3 + X_4\right)^4$, $Y \in \{0, 16, 256\}$

Y	$\Pr(Y)$
0	3/8
16	1/2
256	1/8

TABLE 4: probability

$$E\left(Y\right) = \sum_{k} k \times \Pr\left(Y = k\right) \tag{2.0.3}$$

$$= 0 \times \frac{3}{8} + 16 \times \frac{1}{2} + 256 \times \frac{1}{8} \tag{2.0.4}$$

$$= 40 \tag{2.0.5}$$

$\therefore E\left(X_1 + X_2 + X_3 + X_4\right)^4 = 40$