

Assignment 2

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Problem 11.16.5.8(exemplar):-

A die is loaded in such a way that each odd number is twice as likely to occur as each even number. Find $P(G)$, where G is the event that a number greater than 3 occurs on a single roll of the die.

Solution:-

Let X be a random variable denoting the number obtained on the die.

Let $\Pr(X = 2m)$ be p ,

$\Rightarrow \Pr(X = 2m - 1) = 2p$, where $1 \leq m \leq 3$

x	1	2	3	4	5	6
$P(x)$	$2p$	p	$2p$	p	$2p$	p

$$\sum_{i=1}^6 \Pr(X = i) = 1 \quad (1)$$

$$\begin{aligned} \Rightarrow \Pr(X = 1) + \Pr(X = 2) + \Pr(X = 3) \\ + \Pr(X = 4) + \Pr(X = 5) + \Pr(X = 6) = 1 \end{aligned} \quad (2)$$

$$\Rightarrow 2p + p + 2p + p + 2p + p = 1 \quad (3)$$

$$\Rightarrow 9p = 1 \quad (4)$$

$$\Rightarrow p = 1/9 \quad (5)$$

$$\Pr(G) = \Pr(X > 3) \quad (6)$$

$$= \Pr(X = 4) + \Pr(X = 5) + \Pr(X = 6) \quad (7)$$

$$= p + 2p + p = 4p = \frac{4}{9} \quad (8)$$