Assignment 8

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Outline

Question

CBSE 12 13.4 Q 13

Let X denote the sum of the numbers obtained when two fair dice are rolled. Find the variance and standard deviation of X.

Definitions

Let X be a random variable representing the sum of numbers

Variable	Probability
$X = 2$	$\frac{1}{36}$
$X = 3$	$\frac{2}{36}$
$X = 4$	$\frac{3}{36}$
$X = 5$	$\frac{4}{36}$
$X = 6$	$\frac{5}{36}$
$X = 7$	$\frac{6}{36}$
$X = 8$	$\frac{5}{36}$
$X = 9$	$\frac{4}{36}$
$X = 10$	$\frac{3}{36}$
$X = 11$	$\frac{2}{36}$
$X = 12$	$\frac{1}{36}$

Mean of X

$$E(X) = \sum_{i=2}^{12} i \times \Pr(X = i) \tag{1}$$

$$= \frac{2 + 6 + 12 + 20 + 30 + 42 + 40 + 36 + 30 + 22 + 12}{36} \tag{2}$$

$$= \frac{252}{36} \tag{3}$$

$$= 7 \tag{4}$$

Variance

$$Var = E(X^2) - (E(X))^2 \tag{5}$$

$$= \sum_{i=2}^{12} i^2 \times \Pr(X = i) - (\sum_{i=2}^{12} i \times \Pr(X = i))^2 \tag{6}$$

$$= \frac{4 + 18 + 48 + 100 + 180 + 294 + 320 + 324 + 300 + 242}{36} - 7^2 \tag{7}$$

$$= \frac{1974}{36} - 49 \tag{8}$$

$$= \frac{35}{6} \tag{9}$$

Standard Deviation

$$S.D = \sqrt{Var} \tag{10}$$

$$= \sqrt{\frac{35}{6}} \tag{11}$$

$$= 2.415 \tag{12}$$