

- 3) Throwing a die, a player gains £20 if 2 turns up, gains £40 if 4 turns up & loses £30 if 6 turns up. He never loses or gains if any other number turns up. Find the expected value of money he gains. Also find its variance.

Wins £20 = if 2 turns up.

Wins £40 = if 4 turns up.

Loses £30, if 6 turns up.

$$\text{Expected gain} = \left(20 \times \frac{1}{6}\right) + \left(40 \times \frac{1}{6}\right) - \left(30 \times \frac{1}{6}\right)$$

$$S = \{1, 2, 3, 4, 5, 6\}.$$

Probability of getting 2 = $\frac{1}{6}$.

Probability of getting 4 = $\frac{1}{6}$.

Probability of getting 6 = $\frac{1}{6}$.

$$\text{Expected gain} = \left(20 \times \frac{1}{6}\right) + \left(40 \times \frac{1}{6}\right) - \left(30 \times \frac{1}{6}\right)$$

$$= \frac{20}{6} + \frac{40}{6} - \frac{30}{6}$$

$$= \frac{60-30}{6} = \frac{30}{6}$$

$$= 5$$

The expected gain is 5.

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