Assignment -5 in LaTeX

Muzaan Mohammed Faizel A P
EE22BTECH11036

GATE 2023 BM QN.12 For a Binomial random variable X, E(X) and Var(X) are the expectation and variance, respectively. Which one of the following statements CANNOT be true?

S.No	E(X)	Var(X)
1	20	16
2	6	5.4
3	10	15
4	64	12.8

TABLE 1

Solution:

$$X \sim \text{Ber}(p)$$

We know ,

$$E(X) = np \qquad (1)$$
$$Var(X) = np(1-p) \qquad (2)$$
$$0 \le p \le 1 \qquad (3)$$
$$\implies -1 \le -p \le 0 \qquad (4)$$
$$\implies 0 \le 1-p \le 1 \qquad (5)$$
$$\implies np(1-p) \le np \qquad (6)$$

Therefore,

$$Var(X) \le E(X) \qquad (7)$$

From the four options,the statement that cannot be true is option (3)