

1. In the 2018-2019 NBA season, the Golden State Warriors won 57 out of 82 games, which is a 70% likelihood of winning. Using this information, the Golden State Warriors plays the five games of the 2019-2020 season. Assuming that the outcomes of the games are independent from each other. Let X denote the number of games that the Golden State Warriors wins in the first five games of the 2019-2020 season.

- (a) (3 points) Write the distribution of X .

$$X \sim \text{Bin}(5, 0.70)$$

- (b) (3 points) Find the probability that the Golden State Warriors wins 4 out of the 5 first games in the 2019-2020 season.

$$\begin{aligned} P(X = 4) &= \binom{5}{4} 0.7^4 (1 - 0.7)^{5-4} \\ &= 5 \times 0.7^4 \times (1 - 0.7)^{5-4} \\ &= 0.36 \end{aligned}$$

- (c) (3 points) Find the $E(X)$.

$$E(X) = 5 \times 0.7 = 3.5$$

- (d) (3 points) Find the $\text{Var}(X)$.

$$\text{Var}(X) = 5 \times 0.7 \times (1 - 0.7) = 1.05$$

2. In the 2018-2019 NHL season, the Colorado Avalanche won 38 out of 82 games, which is a 46% likelihood of winning. Using this information, the Colorado Avalanche plays the first three games of the 2019-2020 season. Assuming that the outcomes of the games are independent from each other. Let X denote the number of games that the Colorado Avalanche wins in the first three games in the 2019-2020 season.

- (a) (3 points) Write the distribution of X .

$$X \sim \text{Bin}(3, 0.46)$$

- (b) (3 points) Find the probability that the Colorado Avalanche wins 2 out of the 3 first games in the 2019-2020 season.

$$\begin{aligned}P(X = 2) &= \binom{3}{2} 0.46^2 (1 - 0.46)^{3-2} \\&= 3 \times 0.46^2 \times (1 - 0.46)^{3-2} \\&= 0.343\end{aligned}$$

(c) (3 points) Find the $E(X)$.

$$E(X) = 3 \times 0.46 = 1.38$$

(d) (3 points) Find the $SD(X)$.

$$SD(X) = \sqrt{3 \times 0.46 \times (1 - 0.46)} = 0.863$$