A and B play a game in which A's probability of winning is 2/3 in a series of seven games. What is probability that, A will win
(i) 6 or more games
(ii) From 3 to 4 games

Solution

A and B play a game in which A's probability of winning is 2/3 in a series of seven games.
(i) Probability that A will win 6 or more games is

$$P(\geq 6) = P(6) + P(7) = \binom{7}{6}\left(\frac{2}{3}\right)^6\left(\frac{1}{3}\right)^1 + \binom{7}{7}\left(\frac{2}{3}\right)^7\left(\frac{1}{3}\right)^0 = 7\left(\frac{2}{3}\right)^6\frac{1}{3} + \left(\frac{2}{3}\right)^7 = 0.263.$$

(ii) Probability that A will win from 3 to 4 games is

$$P(3 \text{ or } 4) = P(3) + P(4) = \binom{7}{3}\left(\frac{2}{3}\right)^3\left(\frac{1}{3}\right)^4 + \binom{7}{4}\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^3 = \frac{7!}{3!4!}\left(\frac{2}{3}\right)^3\left(\frac{1}{3}\right)^4 + \frac{7!}{4!3!}\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^3 = 0.384.$$