

Question 24846A tennis player makes a successful first serve 77% of the time. If she serves 6 times what's the probability she gets: exactly 5 serves, at least 4 serves, no more than 4?

Solution. The number of successful servings in the sequence of 6 serves has **Binomial distribution** with parameters $(6, 0.77)$.

The probability that player gets exactly 5 successful serves equals $\binom{6}{5} 0.77^5 0.23 \approx 0.37$, note that $\binom{6}{5} = 6$. The probability that player gets at least 4 serves

equal $\sum_{i=4}^6 \binom{6}{i} \cdot 0.77^i \cdot 0.23^{6-i} \approx 0.86$, here $\binom{6}{i} = \frac{6!}{(6-i)!i!}$ and the probability

that the player gets no more than 4 equals $\sum_{i=0}^4 \binom{6}{i} \cdot 0.77^i \cdot 0.23^{6-i} \approx 0.43$.