Answer on Question #69438 – Math – Statistics and Probability

Question

A and B are equally good tennis players. Which of the following two events is more probable?

(i) A beats B exactly in 3 games out of 4.

(ii) A beats B exactly in 5 games out of 8.

Solution

Since A and B are equally good tennis players then

$$p = P\{A\ wins\ in\ one\ game\} = q = P\{B\ wins\ in\ one\ game\} = 0.5.$$

To find the probabilities of events (i) – (ii) we must apply binomial distribution (see https://en.wikipedia.org/wiki/Binomial_distribution).

(i) The required probability is

$$\binom{4}{3} 0.5^3 0.5^{4-3} = \frac{4!}{3!\cdot 1!} \cdot 0.5^4 = 4 \cdot 0.0625 = 0.25.$$

(ii) The required probability is

$$\binom{8}{5} 0.5^5 0.5^{8-5} = \frac{8!}{5!\cdot 3!} \cdot 0.5^8 = 56 \cdot 0.00390625 = 0.21875.$$

Since $0.25 > 0.21875$ we conclude that the event (i) is more probable than event (ii).

Answer: Event (i) is more probable.