

BACCALAURÉAT-Session 2015

Epreuve de Discipline Non Linguistique

Mathématiques/Anglais

Probability of winning a serve at tennis

A serve (or more formally, a service) in tennis is a shot to start a point. A player will hit the ball with a racket so it will fall into the diagonally opposite backside box without being stopped by the net. The serve is one of the more difficult shots for a novice, but once mastered, it can be a considerable advantage.

There are multiple reasons why a service attempt may result in a fault. After a fault, the play stops immediately. If there has been only one fault on this point, the server is then allowed another attempt. If there have been two faults on this point, the point is awarded to the receiver: this is known as a double fault.

[http://en.wikipedia.org/wiki/Serve_\(tennis\)](http://en.wikipedia.org/wiki/Serve_(tennis))

During a tournament, a certain professional player gets his first serve in the service box about 75% of the time. If he misses his first serve, his second serve goes in the service box about 90% of the time. Let's call S_1 the event "he succeeds his first serve" and S_2 the event "he succeeds his second serve".

Questions:

- 1) Make a short presentation of the text.
- 2) a) Complete the tree diagram opposite.
b) What is the probability of making a double fault?
c) Show that the probability he succeeds his serve is 0.975.
- 3) During a match, a tennis player serves 50 times. Assume each serve is independent from all the others. X is the random variable equal to the number of successful serves.
 - a) Which distribution does X follow?
 - b) What is the probability that the random value X takes on a value greater than or equal to 49? What does it mean?
 - c) What is the expected value $E(X)$? Interpret the result.
- 4) The probability that he succeeds his second serve is greater than the probability that he succeeds his first serve. Can you explain why? What do you think of the importance of succeeding a serve during a match?

