

Probability & Statistics (MA2670), Term 1 - 3rd Tutorial

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- A population of organisms is such that each organism produces an offspring of the same type. The offsprings of the initial population form the 2nd generation; offspring of the 2nd generation comprise the 3rd generation, and so on. The probability for the entire population comprising all organisms to die out by the n -th generation ($n \in \mathbb{N}$), before any offspring can be produced, is $\exp(-(2n^2 + 7)/(6n^2))$. What is the probability that the population survives forever?
- A bus arrives at a bus-stop, randomly between the times of 1pm and 1:30pm, daily. What is the probability that a person who arrives at the bus-stop at 1pm, will need to wait at least 10min to catch the bus? We assume that 0 time elapses between the bus arriving at the bus-stop and the passenger catching it.
- State if the following statements are true or false. If true, prove it. If false, provide justification, and/or an example to support your assertion that the statement is false.
 - (a) If an event A occurs with probability 1, it is a sample space.
 - (b) If an event B occurs with probability 0, it is a null set.
- Show that the probability of randomly picking a rational number from the interval $(0, 1)$ is 0. *Hint: use the result that the set of rational numbers in any interval on the Real Line, is a countable set.*
This is not a question, the type pf which you will be examined upon, but I include it here, and provide a wordy - compared to notation-driven solution, to bring home this important result. The general theorem is that probability of randomly selecting any element of a countable set, from any interval on the Real Line, is zero.
- A random sample of 45 lecturers from different universities were selected to answer if they were happy with their teaching loads. 32 answered that they were not happy. If the responders included Dr. A, Dr. B and Dr. C, what is the probability that all three answered about being unhappy with the teaching load?

- For 2 events A and B , what is the probability that neither A , nor B has occurred?