Probability Axioms

Textbook chapter 2.2 is rather abstract. A few notes here to help you. First, we will stick with Axiom III’ instead of Axiom III. Axiom III’ is the countable union, which of course include Axiom III which is the finite union. If you read Bertsekas and Tsitsiklis’s book chapter 1.2, you will see some very nice explanation of the concept on page 9 and page 10. Try to read the discrete model and the continuous model on page 10 - page 13 of Bertsekas and Tsitsiklis.

Corollaries 1-7 of the textbook chapter 2.2 have two usage: One, the corollary tells you some facts about probability axioms. Two, the proofs of the corollaries give you some ideas of how the axioms can be used. So I would encourage you to read the corollaries carefully. I don’t expect you to remember the steps; but you should at least try to digest these ideas.

Example 2.9-2.13 can be understood without going through the main text. So if you get lost because of the main text, you can just skip and read the examples. As long as you can understand these examples you are fine.

Conditional Probability

Conditional probability is perhaps the most tricky concept in this course. My experience is that students often had difficulty in knowing when to apply conditional probabilities. The rule of thumb is: As long as certain event depends on other events, then you need to use conditional probability. To have a better picture of the conditional probability, I would encourage you to read textbook example 2.24 carefully. Example 2.25 is less intuitive which you may skip, but Example 2.26 is easy to follow.

The discussion by Bertsekas and Tsitsiklis chapter 1.3 is more thorough than our textbook. Example 1.6 of BT is important. I also like the example about Figure 1.8. It is a 2-dimensional problem, but the illustration of the conditional probability is very good. Examples 1.10-1.12 are relatively more challenging. But they are very good thinking exercises.