# Lecture 5.2

## P(-|F) as a probability measure

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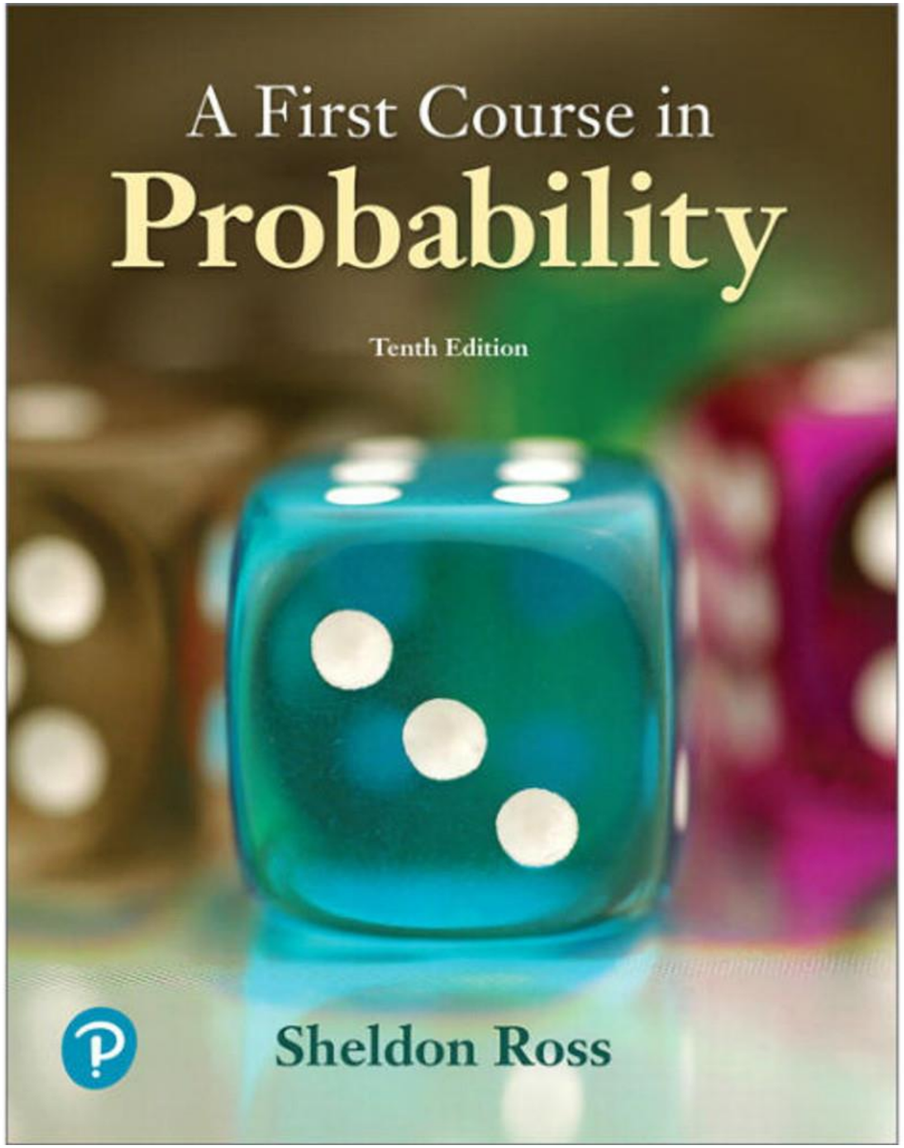



**Today's reading: 3.5**

**Next class: review for MT1**

**MA/STAT 416 Help Room is NOW OPEN!**

HW4 is due Friday.

MT1 is on Monday (will happen in class).

# Monday's draft problem – revisited

There are 150 types of Pokémon. When wandering around Kanto, the probability that Ash Ketchum has an encounter with Pokémon $i$ is $p_i$ (where $\sum_{i=1}^{150} p_i = 1$, of course).

Assume that Ash has $N$ encounters with Pokémon. Let $A_i$ be the event that at least one of these encounters is with Pokémon $i$. Let $i, j, k$ be 3 distinct Pokémon. Determine $P(A_i | A_j \cup A_k)$.

# Today's draft problem

**To be presented by today's draftee.**

A pair of dice is repeatedly rolled, and we keep track of their sum as our outcome.

What is the probability that a sum of 9 appears before a sum of 6?


[Hint: compare to Example 4h in Chapter 3.]

# *LET'S COVER THE LAST LITTLE BIT OF THEORY WE NEED BEFORE MT1*

There are several nice examples in Section 3.5 (although none of them are that closely tied to the theory from that section we're about to discuss …)

We'll cover at least one of those examples in a minute (Laplace's rule of succession).

# P(-|F) is a probability measure

## Proposition 5.1 from the book:

Let $P$ be a probability measure on a sample space $S$, and let $F \subset S$ be an event with $P(F) > 0$. Then the conditional probability $P(-|F)$ defines another probability measure on $S$.

In other words, $P(-|F)$ satisfies the 3 axioms of a probability measure on $S$:

a) For any event $E \subset F$, we have $0 \leq P(E|F) \leq 1$.

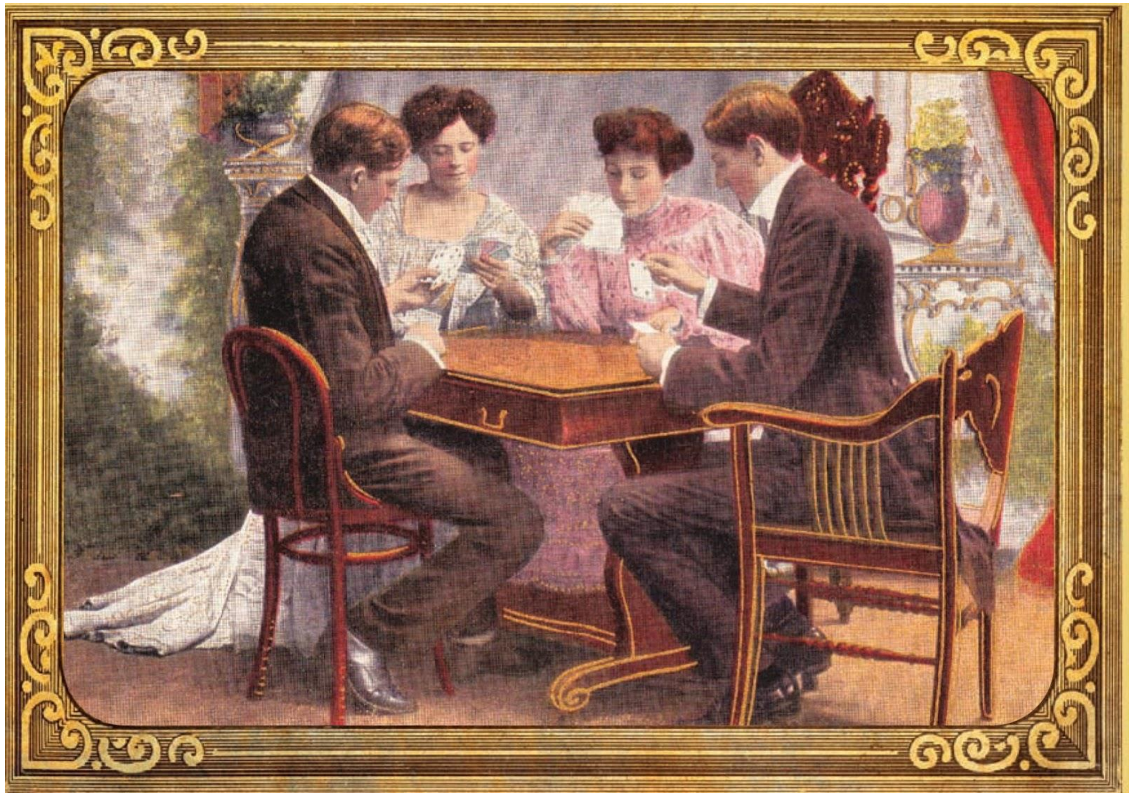
*b)* $P(S|F) = 1$

c) If $E_1, E_2, \ldots$, are mutually exclusive events, then

$$P(\bigcup_{i=1}^{\infty} E_i) = \sum_{i=1}^{\infty} P(E_i)$$

# Friday's draft problem

**To be presented by Friday's draftee.**



This is Question 3(b) from the MT1 practice exam:

What is the probability that in a 13 card hand of bridge, there is at least one suit that is not present?