Larsen & Marx Sixth Edition:
2.2# 2, 4*, 26, 31, 32
2.3# 1, 5, 10
2.4# 1, 9, 22, 29, 34, 45
2.5# 1, 19

*Hints:
- Some problems describe a scenario in words, and you must convert it to event notation. You should not start out by saying “$P(A) = \cdots$, $P(B) = \cdots$” or “$N(S) = \cdots$”; you first need to define what each event $A, B, S, \ldots$ means in that problem.
- 2.2.4: What matters is the set of cards you receive, rather than the order in which you receive the specific cards. So count the set $\{3\spadesuit, 5\spadesuit\}$ just once, rather than counting the two possible orders $(3\spadesuit, 5\spadesuit)$ and $(5\spadesuit, 3\spadesuit)$ separately.

Problem H-101. DNA sequences can be specified as strings in the alphabet of nucleotides, A, C, G, T; for example, AACGTC is a DNA sequence of length 6. (DNA is double-stranded; note that we are only specifying the sequence on one strand.)

(a) How many DNA sequences have length 13?
(b) How many DNA sequences of length 13 contain at least one C? (This restriction only refers to the one strand, not to the complementary strand.)
(c) How many DNA sequences of length 13 contain at least one C but no G’s? (This restriction only refers to the one strand, not to the complementary strand.)

Problem H-102. A gene is sequenced in a study sample comprised of three groups $Q, R, S$. The sample is 30% $Q$, 50% $R$, and 20% $S$.

The gene has two alleles, denoted $V$ and $W$. Each individual has two copies of the gene, giving genotypes $VV$, $VW$, and $WW$. Within each group, the proportions of the genotypes are as follows:

<table>
<thead>
<tr>
<th>Group</th>
<th>Genotype</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$VV$</td>
</tr>
<tr>
<td>$Q$</td>
<td>10%</td>
</tr>
<tr>
<td>$R$</td>
<td>15%</td>
</tr>
<tr>
<td>$S$</td>
<td>25%</td>
</tr>
</tbody>
</table>

(a) A random individual is selected from the sample. What is the probability their genotype is $VW$?
(b) If a randomly selected individual has genotype $VW$, what is the probability they are in group $S$?