(1) Problem 31 from Chapter 1.

(2) Study Problem 42 from Chapter 1.

(3) Problem 40 from Chapter 1.

(4) Suppose my knowledge/ignorance of the number of branches of a certain store is given by the following probability law:

$$\mathbb{P}(k \text{ branches}) = (1-p)p^k \quad \text{where } 0 < p < 1 \text{ and } k = 0, 1, 2, 3, \ldots.$$

If I subsequently discover that they have at least 7 branches (e.g. I walk into store and it says 'branch #7') what new probability law describes my revised knowledge.

(5) Here are the probabilities for the outcomes in the last problem on HW2:

M	A	E
T	1/16	7/32
N	3/32	1/8

F	A	E
T	1/8	1/8
N	3/16	1/16

Show that F and T are not independent, but are independent conditioned on A.

(6) Which is more probable: to obtain n heads from tossing a fair coin independently $2n$ times or to obtain $n+1$ heads by throwing the coin $2n+2$ times? Compute the exact ratio of these probabilities.

(7) Starting at the origin on the line we take a step of one unit to the left or to the right with probability 1/2. We do this repeatedly with independent steps. If we take $2n$ steps, what is the probability that we find ourselves back at the origin.

(8) Problem 53 from Chapter 1.

(9) Problem 58 from Chapter 1.

(10) Seven blue and four red balls are to be arranged in order. How many ways can this be done if
(a) The blue balls are distinguishable (e.g. numbered) as are the red balls.
(b) Blue balls are distinguishable, but the red balls are identical.
(c) The balls of each color are indistinguishable.

(11) How many ways can we order the twenty six letters of the alphabet together with seven (indistinguishable) # symbols?

Continued...

(12) How many ways can we distribute n balls among k bags if
(a) the balls and bags are distinguishable (e.g. numbered).
(b) the bags are distinguishable; the balls are not.
(c) balls and bags are distinguishable, but the bags can contain at most one ball (necessarily, $k \geq n$).
(d) the bags are distinguishable, the balls are not, and the bags can contain at most one ball.
Hint: A small modification of the previous question has the same answer as (b) with $n = 26$ and $k = 8$. Specifically, the number of ways of arranging 26 letter 'o's together with 7 # signs.