Section 8.3

(11) Say there's a 1/60 chance that any given person in the phone book will die in a year. [people live about 80 years; most people in the phone book are over 20.]
The probability that none will die is then $\left(\frac{59}{60}\right)^{1000} = 0.00000005$.
The probability that at least one will die = 0.99999997 — almost certain.

(15) Well, it's true in the long run at least. If something has a non-zero probability of happening on, say, a given day, then if you observe enough days you will see it happen eventually. (But this isn't really what Murphy's law is trying to express!)

(23) If you look at one sequence of 7 rolls, there are 10^7 possible outcomes and only one is equal to my phone number. So the probability is one in ten billion of getting my phone number. If I repeat the experiment often enough, it will happen — but no one would be willing to roll the dice often enough to have a realistic chance of seeing it happen.

(34) There are 16 possible outcomes for my number and my friend's number. In one case, we both picked 3, for a probability of 1/16.
In four cases, we both picked the same number, probability = 4/16.

Section 8.4

(5) Select 3 items from a set of 52, when order doesn't matter:
Number of possibilities = $_{52}C_3 = \dfrac{52 \times 51 \times 50}{3 \times 2 \times 1} = 22{,}100$.

(6) There are 36 choices for each number, so the number of combinations is $36 \times 36 \times 36 = 46{,}656$. [Note that repetition is allowed, and order matters, so the formula is 36^3.]

(8) We just have to list the possibilities (in an organized way):

(1) include a quarter:	1 quarter + 3 pennies
(2) no quarter, 2 dimes:	2 dimes + 1 nickle + 3 pennies
	2 dimes + 8 pennies
(3) one dime:	1 dime + 3 nickles + 3 pennies
	1 dime + 2 nickles + 8 pennies
	1 dime + 1 nickles + 13 pennies
	1 dime + 18 pennies

(4) no dimes: 5 nickles + 3 pennies
4 nickles + 8 pennies
3 nickles + 13 pennies
2 nickles + 18 pennies
1 nickle + 23 pennies
28 pennies

I count 13 ways to make 28¢.

(11) The number of possible outcomes is $_{52}C_3 = 22{,}100$.
The number of ways of picking 3 Jacks from the 4 Jacks in the deck is $_4C_3 = \frac{4\times3\times2}{3\times2\times1} = 4$. [Could also see this by deciding which Jack to leave out.] probability $= \frac{4}{22{,}100} = \frac{1}{5525}$

(13) We are selecting 6 different things from a set of 40, and order doesn't matter, so the number of possible outcomes is $_{40}C_6 = \frac{40\times39\times38\times37\times36\times35}{6\times5\times4\times3\times2\times1} = 3{,}838{,}380$. So the probability of selecting the winning numbers is $\frac{1}{3{,}838{,}380}$.

(24) We are choosing 6 things from a set of 9, and order matters. We'll say repitition is not allowed, since it isn't reasonable to have two buttons programmed with the same station. So, the number of ways is $_9P_6 = 9\times8\times7\times6\times5\times4 = 60{,}480$. [Allowing repetition, it would be 9^6.]

(34) There are $_{21}C_6$ ways of selecting 6 people from 21. (The order in which they are selected doesn't matter.) That's $\frac{21\times19\times18\times17\times16\times15}{6\times5\times4\times3\times2\times1} = 54{,}264$. We also need the number of selections that include me. That's the same as the number of ways of choosing the 5 other people who will get a raise from the other people in the department, which is $_{20}C_5 = \frac{20\times19\times18\times17\times16}{5\times4\times3\times2\times1} = 15{,}504$. The probability is $\frac{54{,}264}{15{,}504} = 0.2857$
(This is $6/21$, as you might have expected.)