5.1 The total number of telephone numbers whose first 3 digits are specified (752 here) is: $10 \times 10 \times 10 \times 10^3 = 10,000$. So, there aren't enough telephone numbers.

5.3 (i) A zip code is formed in five stages ($k = 5$) and the choices in each stage are: $n_1 = \ldots = n_5 = 10$. Therefore the required number is: $10^5 = 100,000$.

(ii) Clearly, the possible values of $X$ are: 0, 1, 2, 3, 4, 5.

(iii) $X(01200) = 2$, $X(13057) = 4$, $X(95616) = 5$.

5.5 The answers are as follows:

(i) $10 \times 10 \times 10 = 10^3 = 1,000$. (ii) $10 \times 9 \times 8 = 720$.

(iii) $1 \times 10 \times 1 = 10$ with repetition, and $1 \times 8 \times 1 = 8$ without repetitions.

(iv) $\binom{10}{2} = \frac{10 \times 9}{2} = 45$.

5.7 In the first place, there are 11 blocks altogether and the number of ways of lining them up would be $11!$, if they were distinct. In order to find the number of distinct permutations, we have to divide $11!$ by the product $2! \times 4! \times 5!$ to obtain $\frac{11!}{2!4!5!}$. Arguing in a similar fashion, we get:

(i) $\frac{11!}{2!4!5!} = 330$.

(ii) $\frac{11!}{2!4!5!} = 330$.

(iii) $\frac{11!}{2!4!5!} = 330$.

5.19 In the first place, the 3 numbers can be chosen in $\binom{33}{3}$ ways.

If their product is to be a negative number, there must be either 2 positive numbers and 1 negative number, or all 3 negative numbers. This happens in:

$\binom{17}{2} \times \binom{2}{2} = \frac{17 \times 16}{2} \times \frac{2 \times 1}{2} = 208$.

Then the required probability is:

$\frac{208}{33 \times 32 \times 31} = \frac{208}{33 \times 32 \times 31} \approx 0.518$.

**Note:** Observe that we arrive at the same answer if the order in which the 3 numbers are selected is not taken into consideration.
5.21 The 500 bulbs can be chosen in \( \binom{500}{230} \) ways, and \( x \) defective can be chosen in \( \binom{230}{x} \) ways, whereas the 500 - \( x \) good bulbs can be chosen in \( \binom{180}{500-x} \) ways. Since the probability of having exactly \( x \) defective bulbs among the 500 chosen is:

\[
\binom{230}{x} \binom{180}{500-x} /
\binom{500}{230}
\]

the required probability is given by:

\[
\sum_{x=0}^{230} \binom{230}{x} \binom{180}{500-x} \binom{500}{230}^{-1}
\]