SOLUTIONS

$\boxed{1}$ a) Since the coin is tossed four times we have 4 task T_1, T_2, T_3, T_4 and two possibilities for each task. Hence in total there are
$2 \cdot 2 \cdot 2 \cdot 2 = 16$ outcomes.

b) Check example 1, b page 369.

$\boxed{2}$ We have 1 task T_1 which determines the letter and 4 tasks that determine each digit. So in total there are

$$26 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 260000$$

such serial numbers.

$\boxed{3}$ a) $C(n, n-2) = \dfrac{n!}{(n-2)!\,(n-(n-2))!} = \dfrac{n!}{(n-2)!\,2!} = \dfrac{n(n-1)}{2}$

b) $P(n, n-2) = \dfrac{n!}{(n-(n-2))!} = \dfrac{n!}{2!} \underset{\text{which turns out to be the same}}{=} (n-2)\cdot C(n, n-2)$

c) $P(n,1) = \dfrac{n!}{(n-1)!} = n$

d) $C(2015, 2014) = 2015$.

$\boxed{4}$ Notice that we need to count all the permutations of 7 people taken 7 at a time. That is $P(7,7) = 7!$.
Alternatively, imagine the line as $\boxed{7|6|5|4|3|2|1}$.
There are 7 possibilities for the first box. Now that one is picked, there are 6 possibilities for the second spot and so forth.

$\boxed{5}$ a) If there are no restrictions, similarly as in exercise 4 we get $P(8,8) = 8!$ ways.

b) First we arrange the couples into $4!$ ways. Then within each couple we have $2!$ ways of arrangement. So by multiplication principle there are

$$4! \cdot 2! \cdot 2! \cdot 2! \cdot 2!$$

ways. Alternatively, $\boxed{8|1|6|1|4|1|2|1}$.

c) Similarly as above, we have $2! \cdot 4! \cdot 4!$ ways.

Alternatively $\boxed{8|3|2|1|4|3|2|1}$.

$\boxed{6}$ a) $C(15,10)$

b) We use multiplication principle. There are $C(3,2)$ ways to pick 2 questions out of first 3 questions. And $C(12,8)$ way for the remaining 8 questions. So in total

$$C(3,2) \cdot C(12,8)$$