Q. 1) (Ross #1.2) For each time, there are 6 outcomes. It follows from the generalized basic principle that there are $6 \times 6 \times 6 \times 6 = 1296$ outcomes for 4 times.

Q. 2) (Ross #1.17) The first gift can go to any of the 10 children, the second to any of the remaining 9 children, and so on. Hence, there are $10 \times 9 \times 8 \times \cdots \times 5 \times 4 = 604800$.

Q. 3) (Ross #2.7)

(a) For each member, there are two choices of collar and there are three choices of political affiliation. Then there are $2 \times 3 = 6$ possible outcomes for each member. So there are $6^{15}$ outcomes for 15 members.

(b) Consider the complement: there are no blue-collar worker, or all workers are white collar. Then there are $1 \times 3 = 3$ possible outcomes for each member. So the complement has $3^{15}$ outcomes for 15 members. And the final answer is $6^{15} - 3^{15}$.

(c) That is, all workers have two choices of political affiliation: Republican or Democratic. Then there are $2 \times 2 = 4$ possible outcomes for each member. So there are $4^{15}$ outcomes for 15 members.

Q. 4) (Ross #2.17)
It means that there is only one rook on each row and on each file. We consider putting 8 rooks on chessboard one by one. For the 1st rook, it can be on any row or on any file, there are $8 \times 8 = 8^2$ places for it. For the 2nd rook, it can not be put on the rows and the files that the 1st rook has occupied. There are 7 rows and 7 files to put the 2nd rook, or $7 \times 7 = 7^2$ places for it. For the 3rd rook, it can not be put on the rows and the files that the 1st rook and 2nd rook have occupied. There are 6 rows and 6 files to put the 2nd rook, or $6 \times 6 = 6^2$ places for it. Similarly, there are $5^2$ places for 4th rook,......there are $2^2$ places for 7th rook and there is
\[ 1^2 = 1 \] place for the last rook. So there are
\[ 8^2 \cdot 7^2 \cdot 6^2 \cdot \ldots \cdot 2^2 \cdot 1 = (8!)^2 \]
outcomes under the given condition.
Now we need to know the number of sample space. For the 1st rook, there are \(8 \times 8 = 64\) places to put. Further, there are \(64 - 1 = 63\) places for 2nd rook, 62 places for 3rd rook,...... 58 places for 7th rook and there are 57 places for 8th rook. So the number of sample space is \(64 \times 63 \times 62 \times \ldots \times 58 \times 57\). Thus the final answer is
\[
\frac{(8!)^2}{64 \times 63 \times \ldots \times 58 \times 57} = \frac{(8!)^2}{\left(\binom{64}{8} \times 8!\right)} \cdot \frac{8!}{\left(\binom{64}{8}\right)}.
\]