1. In each case, the result is a product by the Rule of Product.
   (a) Choose the face values for the three of a kinds $\binom{13}{2}$
   AND the suits for those cards $\binom{4}{3}^2 = 4^2$.
   This gives $13 \times 6 \times 4^2 = 1248$.
   (b) Choose the face values for the pairs $\binom{13}{2}$
   AND the suits for those cards $\binom{4}{2}^2 = 6^2$
   AND the face values for the remaining two cards $\binom{11}{2}$
   AND their suits 4^2.
   This gives $13 \times 12 \times 11 \times 10 \times 6^2 \times 4 = 2,471,040$.

2. (a) IMPOSSIBLE. A list without repeats can't contain more elements than the set.
   (b) Except for labeling the vertices, there is just one such graph: A square with its diagonal and a fifth point with no edges.
   (c) IMPOSSIBLE. An n-vertex simple graph has at most $\binom{n}{2}$ edges, but $\binom{4}{2} = 6$.

3. (a) Since $\mathcal{P}_2(V)$ has $N = \binom{n}{2}$ elements, we must form a multiset of size q from a set of size N. This can be done in $\binom{N+q-1}{q}$ ways.

3. (b) Since $V \times V$ has n^2 elements, we can reason as in (a) with $N = n^2$.

4. (a) $q_k(n) - q_{k-1}(n)$ counts partitions of n whose largest part is k. (To see this, note that every partition counted by $q_k(n)$ is also counted by $q_{k-1}(n)$ unless it has a part of size k.)

4. (b) To produce a partition with largest part at most k, either, *do not* include a part of size k OR *do* include a part of size k.
   - *do not*: We have partitions of n with parts of size at most $k-1$, and these are counted by $q_{k-1}(n)$.
   - *do*: We have a part of size k and a partition of what is left into parts of size at most k. Since $n-k$ is left, this is counted by $q_k(n-k)$.

   You were not asked for initial conditions or how large n and k must be in the recursion, but here's one way to get an answer. The argument leading to the recursion seems to work for $n > 0$ and $k > 1$ if we're careful about what happens when we have a part of size k. Since that should only happen if $k \geq n$, $q_k(n-k)$ should be zero when $k < n$. In other words, $q_k(m) = 0$ for $m < 0$ is one initial condition and $q_k(0) = 1$ is another. We also need to specify $q_1(n)$ since that appears in the recursion when $n = 2$. Clearly $q_1(n) = 1$ for $n > 0$. These are the initial conditions that we need.