

# Combinatorics question

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Hi all, I have a problem regarding combinatorics. Let's see if I'm capable of explaining myself correctly:

I have  $S$  distinct elements, from which I will pick four. So far, the number of groups I can make up this way is  $C(S,4)$  or  $S! / \{4!(S - 4)!\}$ .

Now, from those  $C(S,4)$  possibilities, I want to discard those which share 3 elements, well just one of the two. Let's better put an example:

I have the letters a,b,c,d,e,f (6 elements), and I can group them together in groups of four in  $C(6,4)=15$  ways:

abcd  
abce  
abcf  
abde  
abdf  
abef  
acde  
acdf  
acef  
adef  
bcde  
bcdf  
bcef  
bdef  
cdef

Now, I have to start to discard: "abce" is the first one to discard, since "abc" already appeared on the first combination, and same with "abcf". I also reject "abde" as "abd" appeared on the first combination, "abdf" too. I'll mantain "abef" since it has only two elements repeated with the first combination. Doing this for all combinations, I end up with only three: "abcd", "abef" and "cdef".

So, I'd like to know if there's an easy way to know how many valid combinations there are, and which ones they are. I'm aware that

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depending on which one I start to compare from, I will end up with different solutions, but I don't care about that. Any formula, algorithm or help is much appreciated. Thanks in advance,

Keta

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