1. We argued C(n,m) = C(n-1,m) + C(n-1,m-1) for n = 5 and m=3 by considering the 5-set {a, b, c, d, e}

and the item e as we related the 3-subsets of {a, b, c, d, e} to 3-subsets and 2-subsets of the 4-set {a, b, c, d}.

Give the argument (show all relevant 3-subsets of 5-set {a, b, c, d, e} and 3-subsets and 2-subsets of a suitable 4-set) by focusing on the item a.

2. Complete the following sentences/equations for proving the general case of C(n,m) = C(n-1,m) + C(n-1,m-1) for 1 <= m <= n.

(a) Consider the n-set X = {x1, x2, ..., xn}.

(b) Divide the ..... many m-subsets of X into two disjoint groups, i.e., two types:

(b.1) those containing x1, and those not containing x1.

(b.2) There are ..... many m-subsets of 1st first type because they are obtained by adding ..... to each of the ..... -subsets of {x2, x3, ..., xn}.

(b.3) There are ..... many m-subsets of the 2nd type because they are just .....-subsets of {x2, x3, ..., xn}.

(c) This shows C(n,m) = .....

3. What goes wrong, i.e., which of the steps (a)-(c) breaks down in the proof in Problem 2 when m = 0?

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