

Practice Questions for Jan 24, 2019

1. Consider three subsets A , B , and C of Ω (see the previous practice questions). Answer the following counting questions in terms $|A|$, $|B|$, $|C|$, $|A \cap B|$, $|A \cap C|$, $|B \cap C|$, $|A \cap B \cap C|$, and $|\Omega|$, as needed. Give the simplest (most simplified) formula possible.
 - (a) Show the size of the set of items in A that are not in B or C .
 - (b) Show the size of the set of items that are in exactly one of A or B or C .
 - (c) Show the size of the set of items in both A and B but not in C .
 - (d) Show the size of the set of items that are exactly in two of A , B , and C .
2. Use the formulas $mC(n, m) = (n - m + 1)C(n - 1, m - 1)$ and $C(n, m) = C(n - 1, m - 1) + C(n - 1, m)$ to obtain the formula $C(n, m) = \frac{n}{m} C(n - 1, m - 1)$ for $1 \leq m \leq n$.
3. Consider an n -set $S_n = \{x_1, x_2, \dots, x_n\}$ and, likewise, an $(n - 1)$ -set S_{n-1} . Draw the lines connecting all m -subsets and $(m - 1)$ -subsets of S_{n-1} to m -subsets of S_n for $n = 5$ and $m = 2$. (Write the subsets in systematic order.)
4. Draw the lines connecting all m -subsets of S_n to $m - 1$ -subsets of S_n for $n = 5$ and $m = 2$. (Write the subsets in systematic order.)