

⑦ Let m and n be integers with $m < n$ and let r be any number other than 1. Simplify the sum

$$\sum_{i=m}^n r^i = r^m + r^{m+1} + r^{m+2} + \dots + r^{n-2} + r^{n-1} + r^n.$$

⑧ Suppose that n lines are drawn in the plane in "general position" (That is, no two lines are parallel and no three lines intersect at a point.) In to how many regions do these lines divide the plane? (Your final answer should be a function of n .)

⑨ A code word is made from the alphabet $\{0, 1, 2, 3\}$. A word is legal if it does not have 3 zeros in a row. Find a recurrence relation which gives the number of legal code words of length n .

⑩ Five women leave their coats in a coat room while attending a concert. After the concert each woman retrieves a ^{random} coat from the coat room. What is the probability that no one leaves with her own coat?