7. Let \( m \) and \( n \) be integers with \( m < n \) and let \( r \) be any number other than 1. Simplify the sum 
\[
\sum_{i=m}^{n} r^i = r^m + r^{m+1} + r^{m+2} + \cdots + r^{n-2} + r^{n-1} + r^n.
\]

8. Suppose that \( n \) lines are drawn in the plane in general position \( \text{``That is, no two lines are parallel and no three lines intersect at a point.''} \) Into 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 \( \{0, A, B, 3\} \). 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 coat from the coat room. What is the probability that no one leaves with her own coat?