1. Let \( A \) be an \( m \times n \) matrix.
   Let \( B \) be an \( n \times p \) matrix.
   Let \( C = A \cdot B \)
   Let \( c_{ij} \) be the \((i, j)\)th element of \( C \), and likewise for \( a_{ij} \) and \( b_{ij} \).
   Express \( c_{ij} \) as a sum of products.

2. Baskin Robins has \( n \) flavors of ice cream. You are building a cone with \( k < n \) scoops. How many different cones can you make if each flavor can only be used once, and the ordering of the flavors matters?

3. Baskin Robins has \( n \) flavors of ice cream. You are building a cone with \( k < n \) scoops. How many different cones can you make if each flavor can only be used once, and the ordering of the flavors does not matter?

4. Simplify the following sums:
   
   (a) \( \binom{n}{0} + \binom{n}{1} + \binom{n}{2} + \cdots + \binom{n}{n} \)
   
   (b) \( \binom{n}{0}x^0 + \binom{n}{1}x^1 + \binom{n}{2}x^2 + \cdots + \binom{n}{n}x^n \)
   
   (c) \( \binom{n}{0}y^n + \binom{n}{1}xy^{n-1} + \binom{n}{2}x^2y^{n-2} + \cdots + \binom{n}{n}x^n \)