4) Calculați $C_4^0 - 2C_4^1 + 4C_4^2 - 8C_4^3 + 16C_4^4$.

$$C_n^k = \frac{n!}{k!(n-k)!}, \quad n \geq k$$

$$C_n^k = C_n^{n-k}$$

$C_4^0 = C_4^4 = 1$

$C_4^1 = C_4^3 = \frac{4!}{3! \cdot 1!} = \frac{3! \cdot 4}{3!} = 4$

$C_4^2 = \frac{4!}{2! \cdot 2!} = \frac{2! \cdot 3 \cdot 4}{2! \cdot 2} = 6.$

Înlocuind, obținem:

$1 - 2 \cdot 4 + 4 \cdot 6 - 8 \cdot 4 + 16 = \underbrace{1-8}_{-7} + \underbrace{24-32}_{-8} + 16 =$

$= -7 - 8 + 16 = -15 + 16 = 1.$