5) The fifth term in \((3a+2b)^7\):
\[C(7,4)(3a)^3(2b)^4 = 15,120a^3b^4\]

14) Prove \(C(n+2, r) = C(n, r) + 2C(n, r-1) + C(n, r-2)\) for \(2 \leq r \leq n\).

\[C(n+2, r) = C(n+1, r-1) \quad \text{by Pascal's Formula}\]
\[\quad \downarrow \quad \text{by Pascal's Formula}\]
\[C(n, r-2) + C(n, r-1) \quad \text{Same}\]
\[\quad \downarrow \quad \text{by Pascal's Formula}\]
\[C(n, r-1) + C(n, r)\]

\[\therefore C(n+2, r) = C(n, r) + 2C(n, r-1) + C(n, r-2)\]

16) Prove \(C(n, 0) - C(n, 1) + C(n, 2) - \ldots + (-1)^n C(n, n) = 0\).
(Note: This problem should also state: \(n > 0\)).

\[0 = 0^n = (1+(-1))^n = C(n, 0)(1)^n(-1)^0 + C(n, 1)(1)^{n-1}(-1)^1 + C(n, 2)(1)^{n-2}(-1)^2 + \ldots + C(n, n)(1)^0(-1)^n\]

\[= C(n, 0) - C(n, 1) + C(n, 2) - \ldots + (-1)^n C(n, n) \quad \text{QED}\]

Note that since the power of \((-1)\) increases by one for each term, the terms will alternate between positive and negative.