Answers to Summation Operators Exercises

1. $\sum_{l=2}^{6} Y_l = Y_2 + Y_3 + Y_4 + Y_5 + Y_6$

2. $\sum_{i=1}^{3} X_i^2 \sum_{2}^{4} 10 = (10+10+10)\sum_{i=1}^{3} X_i^2$

$$= 30 \times (X_1^2 + X_2^2 + X_3^2)$$

3. $\sum_{j}^{3}\sum_{i}^{2}\left(X_{ij}^2 + Y_j\right) = [(X_{11}^2 + Y_1) + (X_{21}^2 + Y_1)] + [(X_{12}^2 + Y_2) + (X_{22}^2 + Y_2)] + [(X_{13}^2 + Y_3) + (X_{23}^2 + Y_3)]$

$$= X_{11}^2 + X_{21}^2 + X_{12}^2 + X_{22}^2 + X_{13}^2 + X_{23}^2 + 2Y_1 + 2Y_2 + 2Y_3$$

4. $\sum_{i}^{5} 5\left(X_i + Y_i + Z_i\right) = 5[(X_1 + X_2 + X_3 + X_4 + X_5) + (Y_1 + Y_2 + Y_3 + Y_4 + Y_5)$

$$+ (Z_1 + Z_2 + Z_3 + Z_4 + Z_5)$$

5. $\sum_{j=5}^{7}\left(\sum_{i=1}^{3} X_{ij}\right)^2 = (X_{15} + X_{25} + X_{35})^2 + (X_{16} + X_{26} + X_{36})^2 + (X_{17} + X_{27} + X_{37})^2$

6. $\sum_{j}^{3} n_j \left(\sum_{i}^{4} X_{ij}\right)^2 = n_1(X_{11} + X_{21} + X_{31} + X_{41})^2 + n_2(X_{12} + X_{22} + X_{32} + X_{42})^2 + n_3(X_{13} + X_{23} + X_{33} + X_{43})^2$

7. $X_1Y_1 + X_2Y_2 + X_3Y_3 + X_4Y_4 + X_5Y_5 + X_6Y_6 = \sum_{i=1}^{6} X_iY_i$

8. $X_1Y_1 + X_2Y_2 + \cdots + X_NY_N = \sum_{i=1}^{N} X_iY_i = \Sigma XY$

9. $(X_5 + Y_5)^2 + (X_6 + Y_6)^2 + (X_7 + Y_7)^2 + \cdots + (X_{10} + Y_{10})^2 = \sum_{i=5}^{10}(X_i + Y_i)^2$

10. $\left(X_1 + X_2 + X_3 + X_4 + X_5\right)^2\left(Y_1^2 + Y_2^2 + Y_3^2 + Y_4^2 + Y_5^2\right) = \left(\sum^{5} X_i\right)^2\left(\sum^{5} Y_i^2\right)$