Some properties of the sum operator, expected value, variance and covariance

In all equations below, x, y and z are random variables. a, b, c are constants.
Sum operator:

$$\begin{aligned}
\sum_{t=1}^{T} x_t &= x_1 + x_2 + x_3 + ... + x_{T-1} + x_T \\
\sum_{t=1}^{T} (x_t + y_t) &= \sum_{t=1}^{T} x_t + \sum_{t=1}^{T} y_t \\
\sum_{t=1}^{T} a x_t &= a \sum_{t=1}^{T} x_t \\
\sum_{t=1}^{T} (x_t + b) &= \sum_{t=1}^{T} x_t + bT
\end{aligned}$$

Expected value (Measuring the mean of a random variable):

$$\begin{aligned}
E(x+y) &= E(x) + E(y) \\
E(ax) &= aE(x) \\
E(x+b) &= E(x) + b \\
E(ax+by) &= aE(x) + bE(y)
\end{aligned}$$

Note that the expected value of a constant is the constant itself.
Variance: (Measuring the uncertainty of a random variable)

$$\begin{aligned}
Var(x) &= E[(x - E(x))^2] \\
Var(ax) &= a^2 Var(x) \\
Var(x+b) &= Var(x) \\
Var(ax+by) &= a^2 Var(x) + b^2 Var(y) + 2abCov(x,y)
\end{aligned}$$

Note that the variance of a constant is zero.

Covariance: (Measuring the comovement of two random variables)

$$\begin{aligned}
Cov(x,y) &= E[(x-E(x))(y-E(y))] \\
Cov(x,x) &= E[(x-E(x))(x-E(x))] = E[(x-E(x))^2] = Var(x) \\
Cov(ax,by) &= abCov(x,y) \\
Cov(x+a,y+b) &= Cov(x,y) \\
Cov(x+y,z) &= Cov(x,z)+Cov(y,z) \\
Cov(ax+by,cz) &= acCov(x,z)+bcCov(y,z)
\end{aligned}$$