Arithmetic Mean and Standard Deviation

The arithmetic mean and standard deviation should only be used for short-term investments that have a maturity of one year or less because it is a simple interest equation that does not account for the compounding that occurs over multiple years. If compounding is occurring, even for an investment less than one year in maturity, then the geometric mean and standard deviation should be used instead. Assuming that you are analyzing "P" number of periods that are less than a year in duration and utilize simple interest, the following equations can be used to derive the period and annualized rates of return and standard deviations:

	Total Periods < 1 Year, Period Output
Arithmetic Mean (AM)	$$AM = \frac{1}{(P)}\sum_{i=1}^{P} r_i$$
Arithmetic Standard Deviation (ASD)	$$ASD = \left[\frac{1}{(P-1)}\sum_{i=1}^{P}(r_i - AM)^2\right]^{\frac{1}{2}}$$

	Total Periods < 1 Year, Annualized Output
Arithmetic Mean (AM)	$$AM = \sum_{i=1}^{P} r_i$$
Arithmetic Standard Deviation (ASD)	$$ASD = \left[\frac{P}{(P-1)}\sum_{i=1}^{P}(r_i - AM)^2\right]^{\frac{1}{2}}$$

If you are analyzing multiple years of simple interest data, you can still apply the arithmetic mean and standard deviation to the data via the following equations:

	Total Periods > 1 Year, Period Output
Arithmetic Mean (AM)	$$AM = \frac{1}{(n \times P)} \sum_{i=1}^{n \times P} r_i$$
Arithmetic Standard Deviation (ASD)	$$ASD = \left[\frac{1}{(n \times P - 1)} \sum_{i=1}^{n \times P} (r_i - AM)^2 \right]^{\frac{1}{2}}$$

	Total Periods > 1 Year, Annualized Output
Arithmetic Mean (AM)	$$AM = \frac{P}{(n \times P)} \sum_{i=1}^{n \times P} r_i$$
Arithmetic Standard Deviation (ASD)	$$ASD = \left[\frac{P}{(n \times P - 1)} \sum_{i=1}^{n \times P} (r_i - AM)^2 \right]^{\frac{1}{2}}$$

Note that sample statistics are being applied since the 1 (one) has been subtracted from all of the "P" and "n×P" denominators for the standard deviation calculations.

Definitions:

n = number of years

P = number of periods per year

r = periodic return