Problems for Lecture 5

Group #2 of Cohort #2

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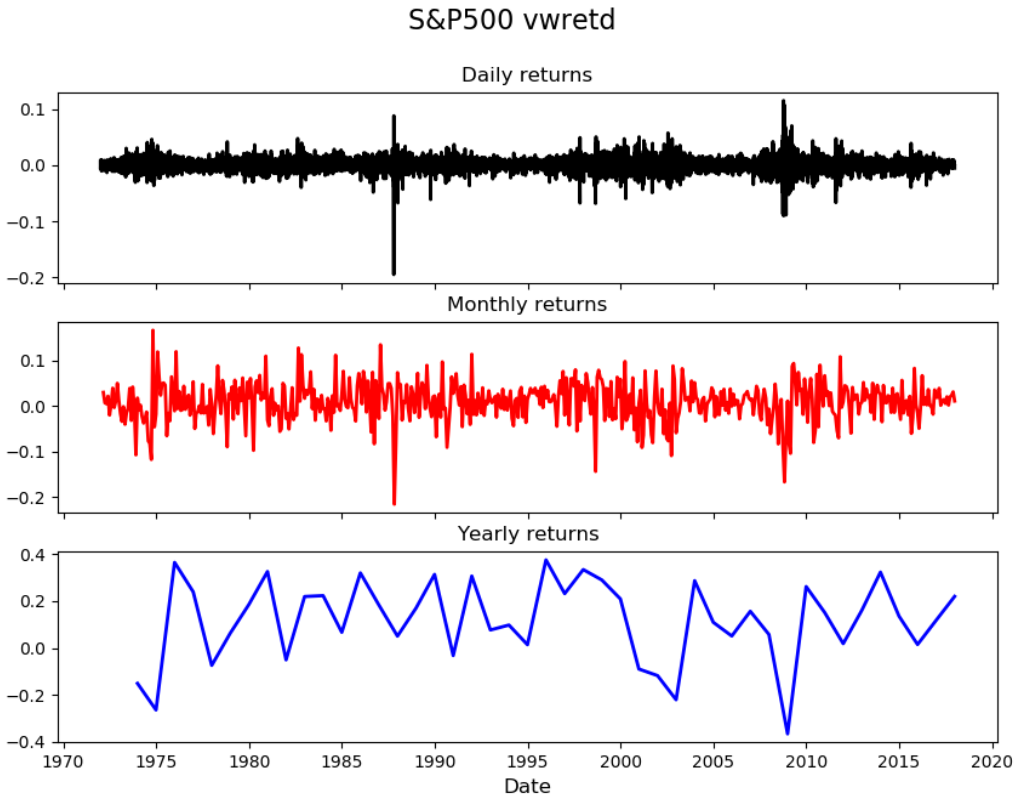
Download the daily returns for S&P500 value-weighted index with dividends (01/03/1972 – 12/30/2017) from CRSP. What was the average arithmetic and geometric historical mean rate of return for daily returns, for monthly returns, and for annual returns from 01/03/1972 through 12/30/2017, and for 5-year returns from 01/03/1972 through 12/30/2016? Make sure to annualize the returns you report.



	Arithmetic Average (%)	Geometric Average (%)
Daily	11.50	10.60
Monthly	11.24	10.58
Yearly	11.92	10.42
Five-Yearly	14.77	9.33

Arithmetic Average: $R = \frac{1}{n}\sum_{i=1}^{n} r_i = \frac{r_1 + r_2 + \ldots r_n}{n}$

Geometric Average: $R = \left[\prod_{i=1}^{n}(1+r_i)\right]^{\frac{1}{n}} - 1 = \sqrt[n]{(1+r_1)\times(1+r_2)\times\ldots\times(1+r_n)} - 1$

To annualize the returns

Arithmetic Average: $R_{annual} = m \times \frac{1}{n}\sum_{i=1}^{n} r_i = m \times \frac{r_1 + r_2 + \ldots r_n}{n}$

Geometric Average: $R_{annual} = \left[\prod_{i=1}^{n}(1+r_i)\right]^{\frac{1}{n}\times m} - 1 = \sqrt[\frac{n}{m}]{(1+r_1)\times(1+r_2)\times\ldots\times(1+r_n)} - 1$

where m is the number of periods within one year, e.g. $m = 12$ for monthly return data.