P1.

Based on the 3 different types of price returns, after simulation assuming $P\ t{-}1 = 0$ and sigma = 0.1, I can get the table

	Expected E(Pt)	Observed E(Pt)	Expected Std(Pt)	Observed Std(Pt)
Brownian	100	99.9990	0.1	0.0999
Arithmetic	100	99.8955	10	9.9952
Geometric	100.5013	100.3946	10.0753	10.0244

The observed mean and standard deviation match the expectations.

P2.

The alpha = 0.05 $VaR value after the calculation:

Using normal distribution: 19.8999

Using normal distribution with an Exponentially Weighted variance (λ = 0.94): 15.9201

Using MLE fitted T distribution: 16.9039

Using fitted AR(1) model: 19.8725

Using Historic Simulation: 15.0364

After observing the data, we can find that the historical simulation provides the lowest VaR which reveals the lowest loss, while the normal distribution provides the greatest VaR, which reveals the highest loss. The different VaRs are given the assumptions and characteristics based on the different model. Therefore, we should choose to use different models depends on the different data.

P3.

The present value of different portfolio is:

A: 1269269.7661

B: 717949.8533

C: 1229623.5392

Total: 3216843.1586

Firstly I want to use Delta Normal VaR method which assumes that payoffs are linear and represent the sensitivity of the portfolio value to small changes in stock prices. The $VaR of different portfolio is:

A: 19466.5044

B: 11504.0442

C: 26815.5607

Total: 52931.1706

Then I have chosen another method which is Historical VaR method which use historical data to observe past portfolio value changes and calculate VaR based on the historical distribution. The $VaR of different portfolio is:

A: 17404.9077

B: 11485.4864

C: 21225.4686

Total: 46410.0203

After comparing 2 different methods, the VaR is quite different because the characteristic of the method is different, since the first one focuses more on linear data and the second method focuses more on non-linear data, and it includes more weight on historical data.