Assignment 7

1) Random Number generation.

```
> myGTid=
> set.seed(myGTid)
> myYear=sample((1980:2010),1)
> sprintf("The year generated is %d",myYear)
[1] "The year generated is 2001"
```

2) The random sampling of 100 Permno is done in SAS and a CSV file is taken as Output to be read in R.

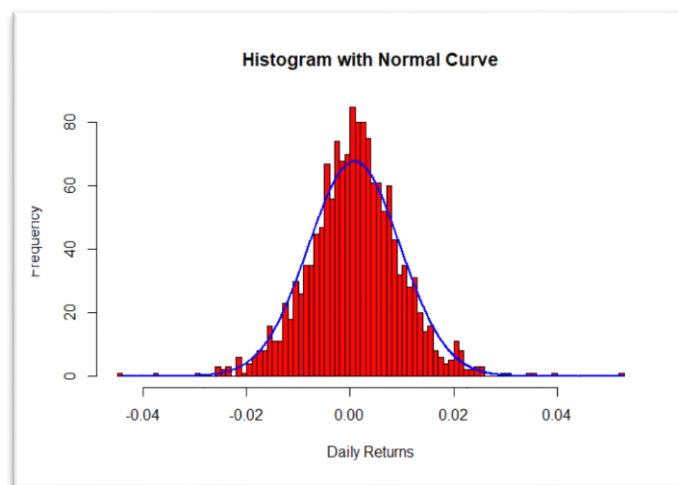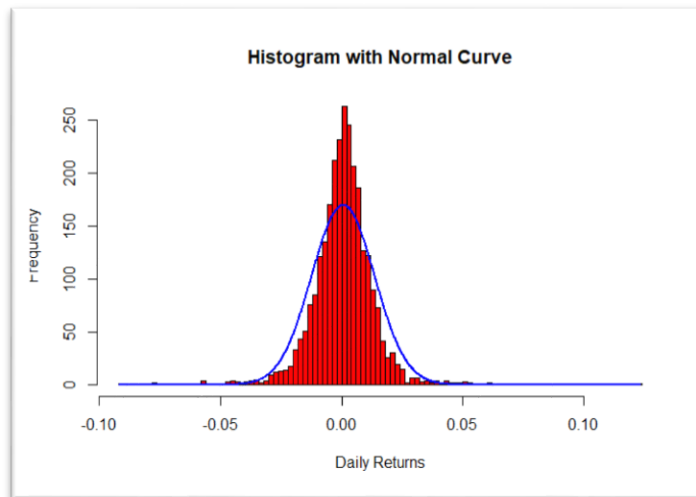3) Calculating VaR and Expected Shortfall for 2001-2006

Fig. Distribution of Returns over 2001-2006

```
> sprintf("one-day 5 percent VaR: %f",VaR_absolute)
[1] "one-day 5 percent VaR: 0.013518"
> sprintf("$VaR: $%f",VaR_dollar)
[1] "$VaR: $1351819.473684"
> sprintf("$Expected Shortfall: $%f",Expected_Shortfall_dollar)
[1] "$Expected Shortfall: $1857413.247542"
```

4) Calculating VaR and Expected Shortfall for 2000-2010


Histogram with Normal Curve

```
> sprintf("one-day 5 percent VaR: %f",VaR_absolute)
[1] "one-day 5 percent VaR: 0.018063"
> sprintf("$VaR: $%f",VaR_dollar)
[1] "$VaR: $1806335.500410"
> sprintf("$Expected Shortfall: $%f",Expected_Shortfall_dollar)
[1] "$Expected Shortfall: $2430097.297488"
```

Comparison of the VaR and Expected Shortfall of these two time periods:
- We can see that One-Day VaR has increased for the 2000-2010 period as compared to 2001-2006 period. This can be explained by the 2008 financial crisis.
- Similarly, the expected shortfall has also increased due to the same reason.

5) Part III - Risk Metrics Plot

Plot of Annualized Variance Calculated in Part III
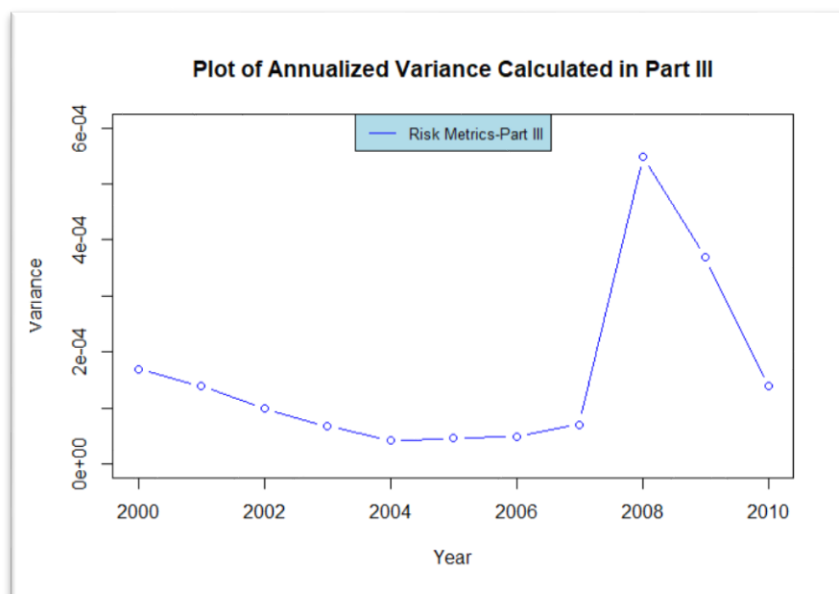
6) Part IV- Calculation of Alpha and Beta using data between 2001-2006

```
> sprintf("The parameter Alpha is %f",coef(x.g)[3])
[1] "The parameter Alpha is 0.067630"
> sprintf("The parameter Beta is %f",coef(x.g)[4])
[1] "The parameter Beta is 0.904152"
> sprintf("The parameter Omega is %f",coef(x.g)[2])
[1] "The parameter Omega is 0.000002"
```

7) Part V- Plot of Comparison of Calculated Variance using GARCH Method and Risk
   Metrics Method
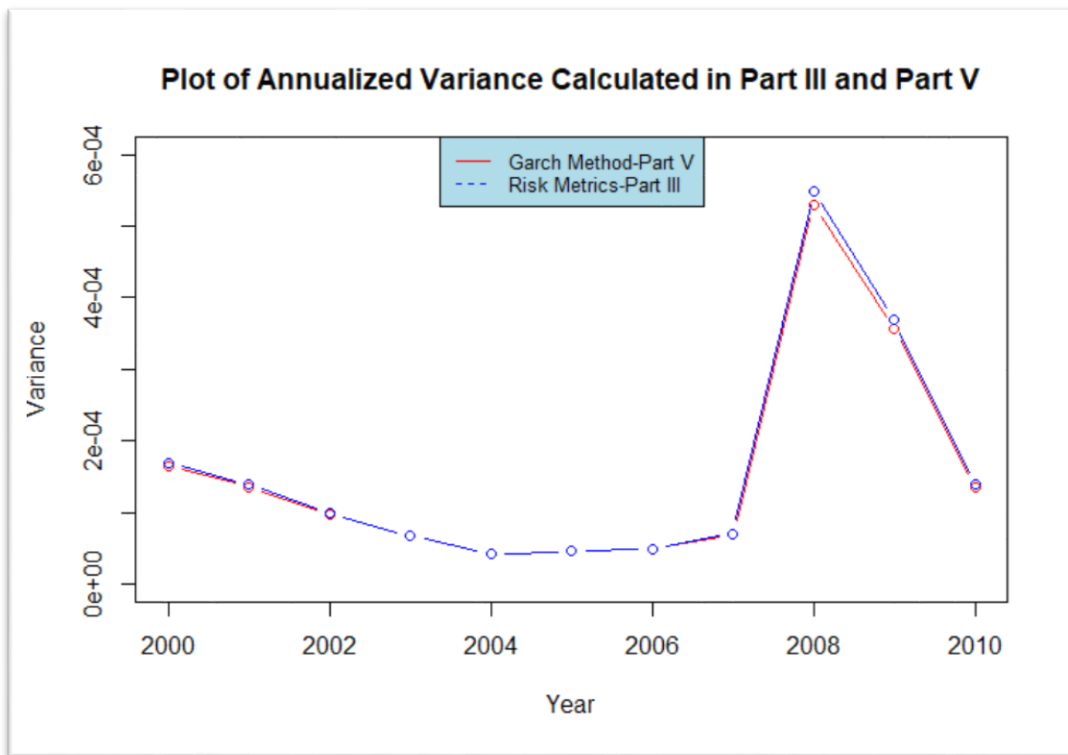
We can see from the plots that the Calculated Variance using both methods are very close.