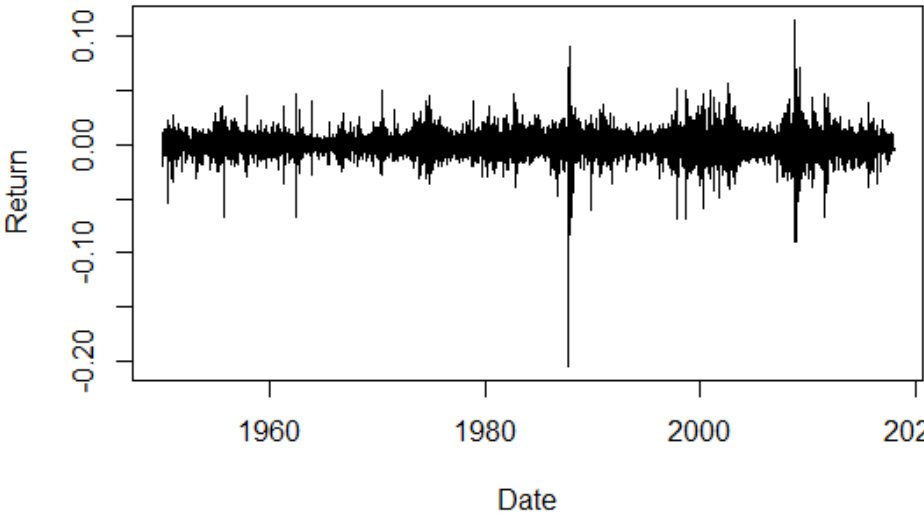
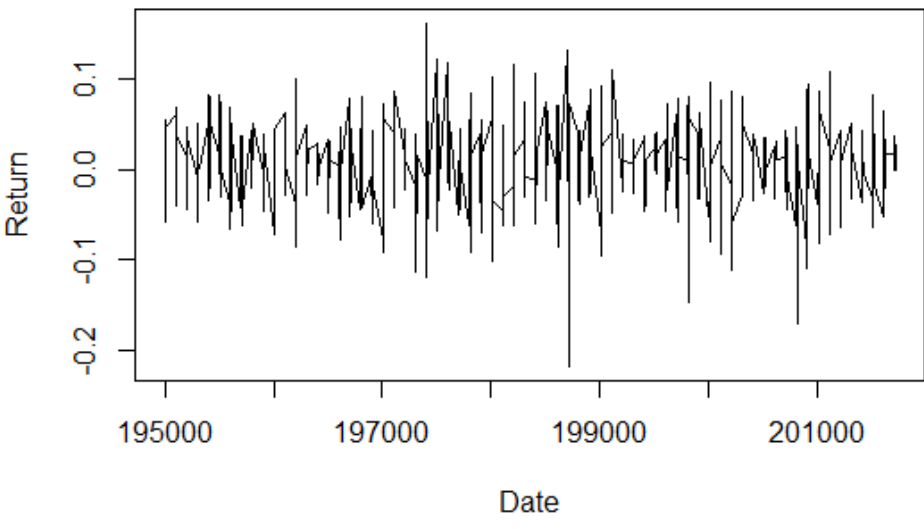
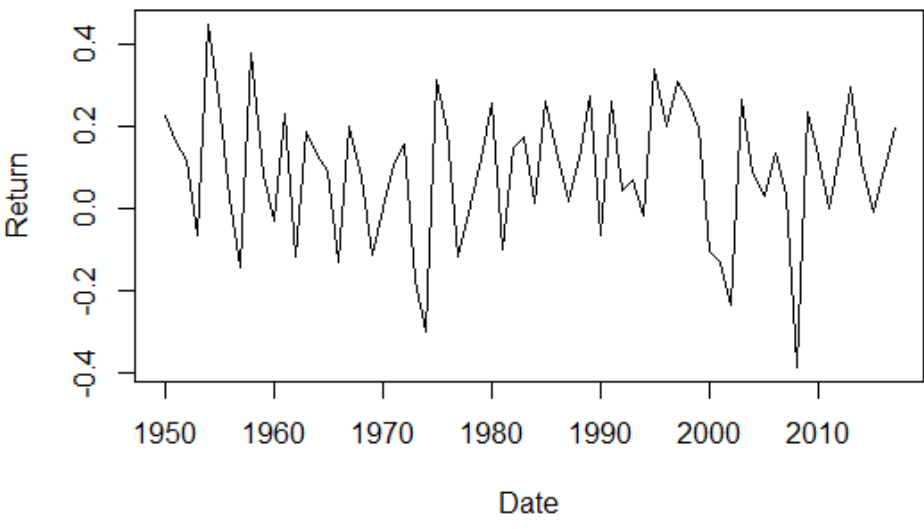
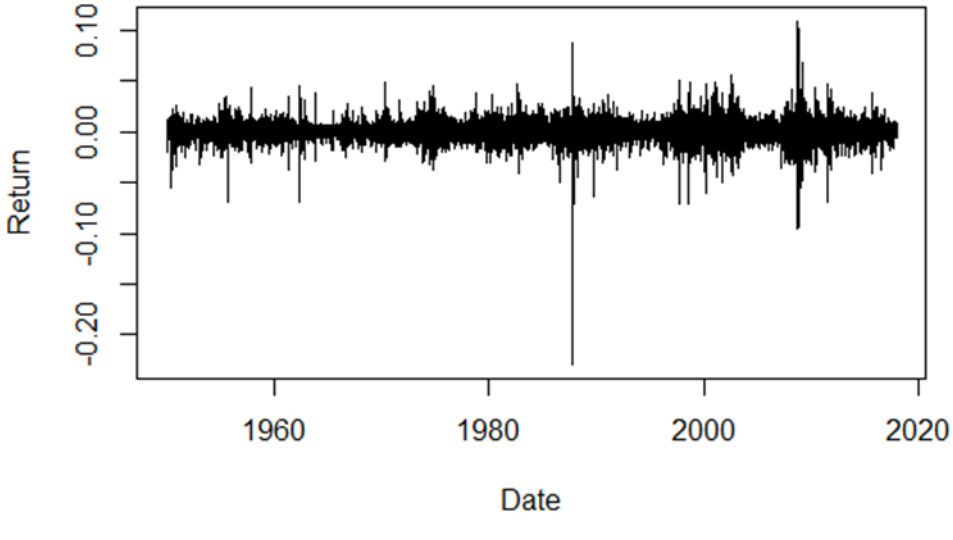
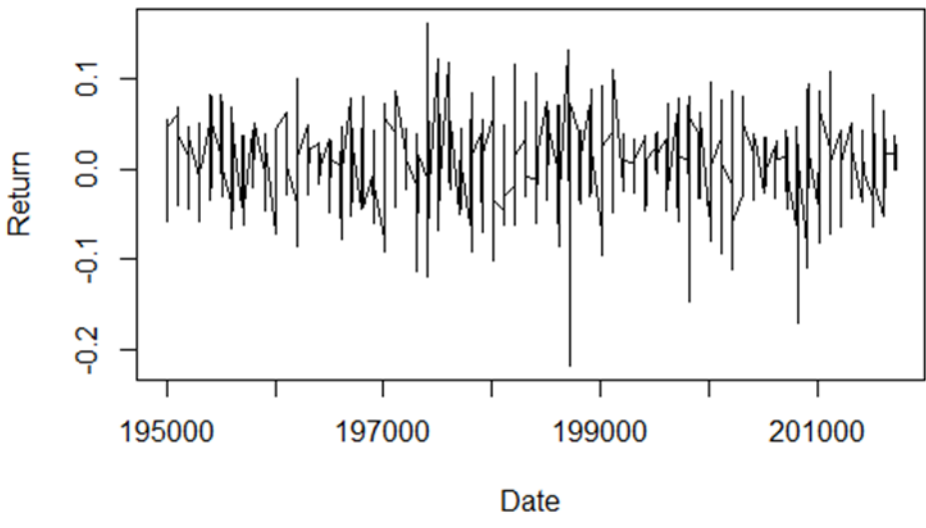
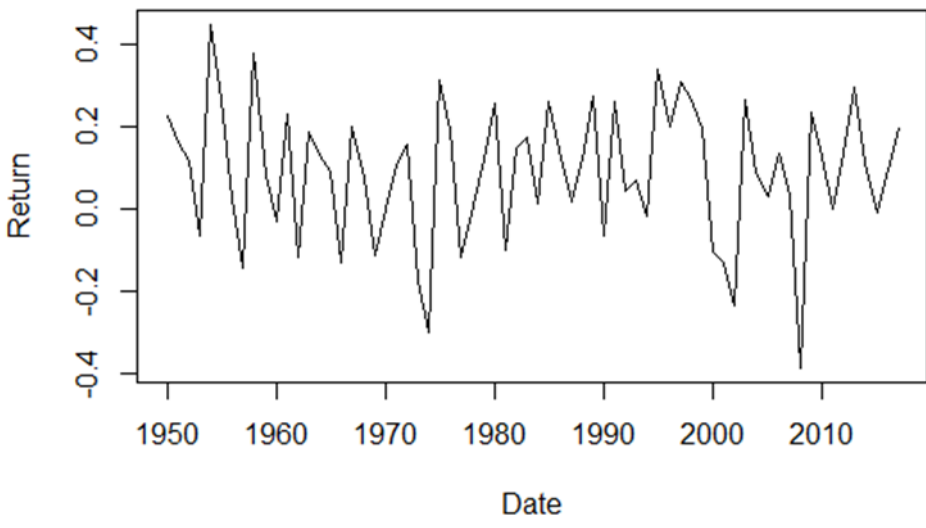


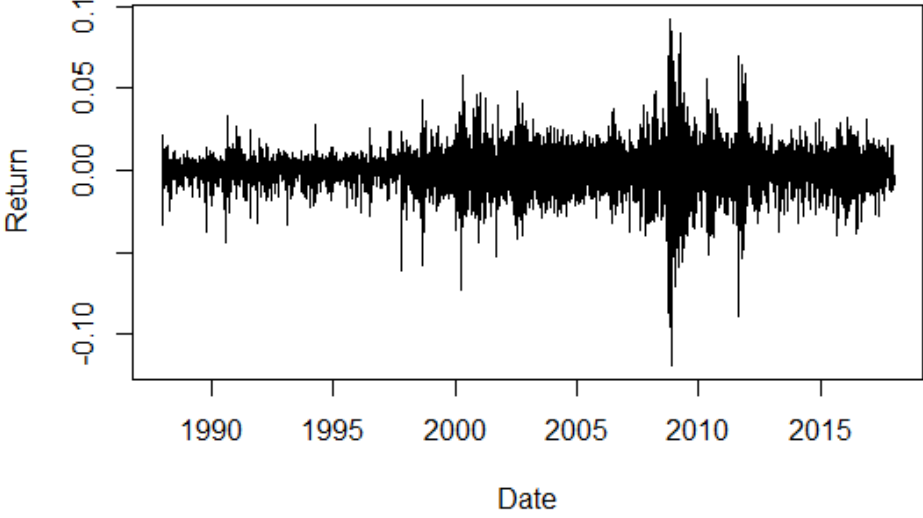
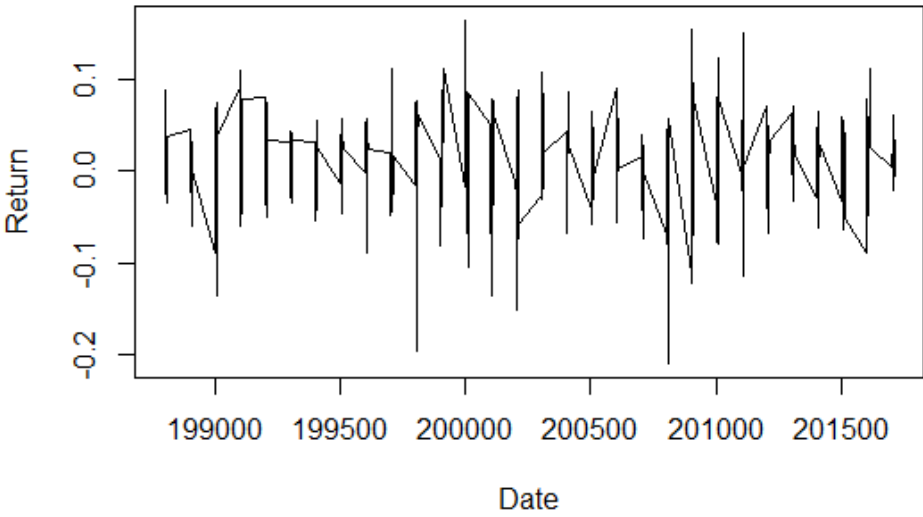
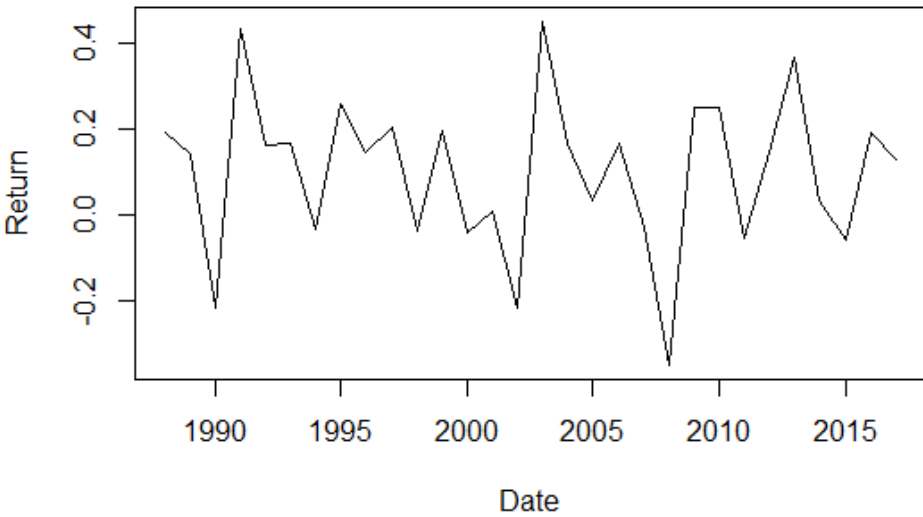
Question 1 – S&P 500

Time series	Plot of returns
Returns Daily	<p>Daily Returns on S&P 500</p> 
Returns Monthly	<p>Monthly Returns on S&P 500</p> 
Returns Yearly	<p>Yearly Returns on S&P 500</p> 

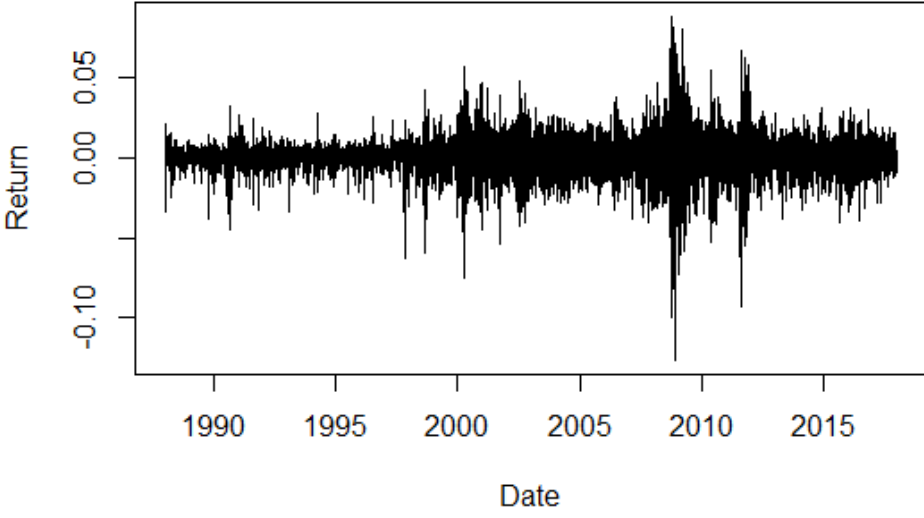
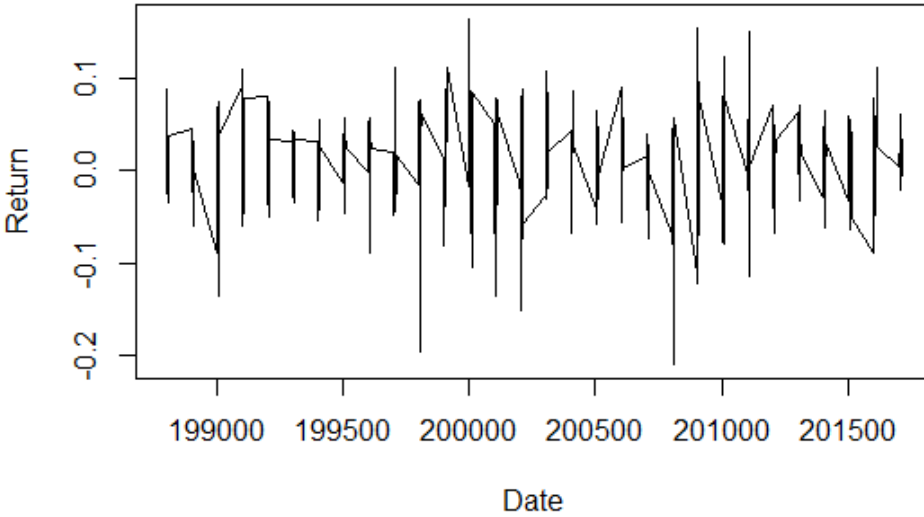
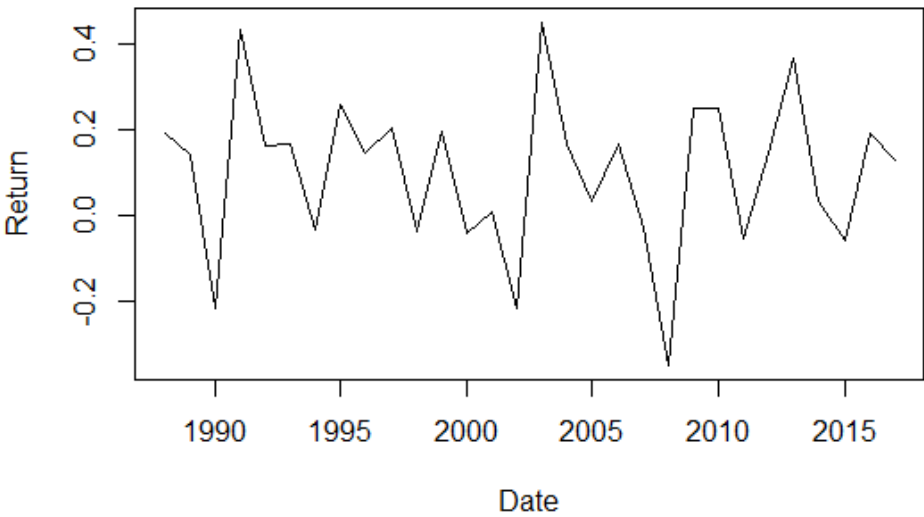
Question 1 – S&P 500

Time series	Plot of returns
Log returns Daily	<p>Daily Log Returns on S&P 500</p>  <p>This plot shows daily log returns from 1950 to 2020. The y-axis, labeled 'Return', ranges from -0.20 to 0.10. The x-axis, labeled 'Date', has major ticks at 1960, 1980, 2000, and 2020. The data is represented by a dense, noisy line fluctuating around zero, with a significant downward spike around 1987.</p>
Log returns Monthly	<p>Monthly Log Returns on S&P 500</p>  <p>This plot shows monthly log returns from 1950 to 2020. The y-axis, labeled 'Return', ranges from -0.2 to 0.1. The x-axis, labeled 'Date', has major ticks at 195000, 197000, 199000, and 201000. The data is shown as a line with vertical error bars for each month, fluctuating around zero with a sharp drop around 1987.</p>
Log returns Yearly	<p>Yearly Log Returns on S&P 500</p>  <p>This plot shows yearly log returns from 1950 to 2020. The y-axis, labeled 'Return', ranges from -0.4 to 0.4. The x-axis, labeled 'Date', has major ticks at 1950, 1960, 1970, 1980, 1990, 2000, and 2010. The data is a line plot showing annual fluctuations, with a major peak around 1954 and a sharp decline around 1987.</p>

Question 1 – Russell 2000

Time series	Plot of returns
Returns Daily	<p>Daily Returns on Russell 2000</p>  <p>The plot shows daily returns from 1990 to 2015. The y-axis is labeled 'Return' and ranges from -0.10 to 0.10. The x-axis is labeled 'Date' and shows years from 1990 to 2015. The data is a dense, noisy line fluctuating around zero, with a notable sharp drop around 2008.</p>
Returns Monthly	<p>Monthly Returns on Russell 2000</p>  <p>The plot shows monthly returns from 1990 to 2015. The y-axis is labeled 'Return' and ranges from -0.2 to 0.1. The x-axis is labeled 'Date' and shows years from 1990 to 2015. The data is a jagged line with vertical error bars, showing more volatility than the daily returns, with a significant drop around 2008.</p>
Returns Yearly	<p>Yearly Returns on Russell 2000</p>  <p>The plot shows yearly returns from 1990 to 2015. The y-axis is labeled 'Return' and ranges from -0.2 to 0.4. The x-axis is labeled 'Date' and shows years from 1990 to 2015. The data is a line connecting annual return points, showing significant volatility with a major peak around 2000 and a sharp drop around 2008.</p>

Question 1 – Russell 2000

Time series	Plot of returns
Log returns Daily	<p>Daily Log Returns on Russell 2000</p>  <p>This plot shows daily log returns for the Russell 2000 index from 1990 to 2015. The y-axis, labeled 'Return', ranges from -0.10 to 0.05. The x-axis, labeled 'Date', shows years from 1990 to 2015. The data is represented by a dense, noisy line fluctuating around zero, with a significant downward spike around 2008.</p>
Log returns Monthly	<p>Monthly Log Returns on Russell 2000</p>  <p>This plot shows monthly log returns for the Russell 2000 index from 1990 to 2015. The y-axis, labeled 'Return', ranges from -0.2 to 0.1. The x-axis, labeled 'Date', shows dates from 199000 to 201500. The data is represented by a line with vertical error bars, showing more volatility than the daily plot, with a sharp drop around 2008.</p>
Log returns Yearly	<p>Yearly Log Returns on Russell 2000</p>  <p>This plot shows yearly log returns for the Russell 2000 index from 1990 to 2015. The y-axis, labeled 'Return', ranges from -0.2 to 0.4. The x-axis, labeled 'Date', shows years from 1990 to 2015. The data is represented by a line connecting annual data points, showing significant volatility with major peaks around 1991, 2003, and 2013, and a deep trough around 2008.</p>

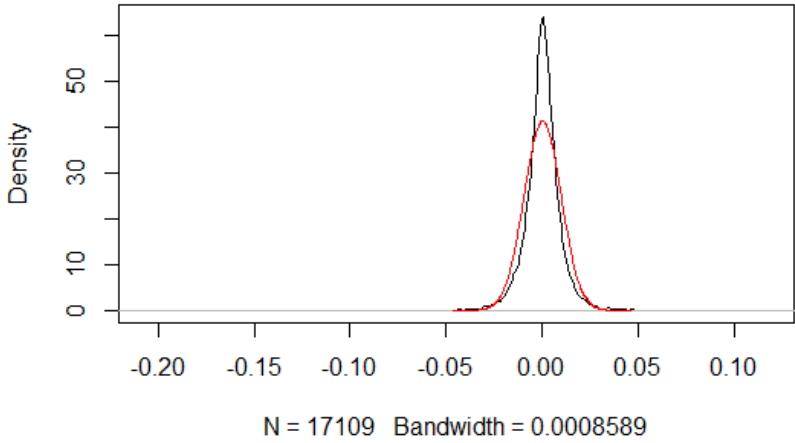
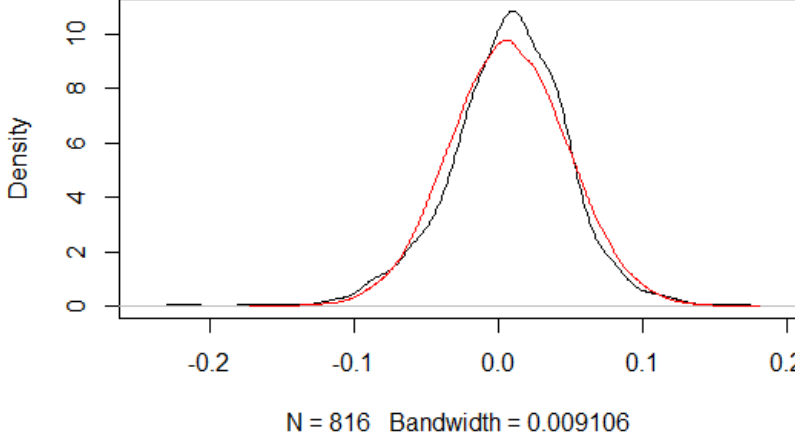
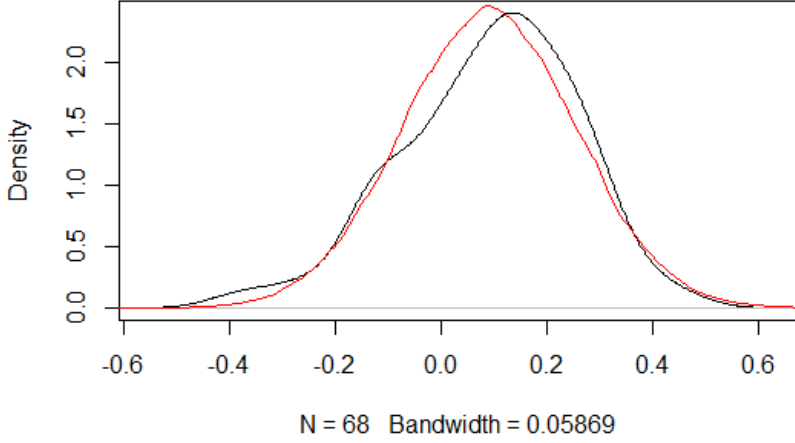
Question 2 – S&P 500

Time series	Sample Mean	Sample Std Dev	Sample Skewness	Sample Kurtosis
Returns Daily	0.03432417 %	0.009608086	-0.64431	24.03687
Returns Monthly	0.7090804 %	0.04104048	-0.4286023	4.804351
Returns Yearly	9.084287 %	0.1649238	-0.4621956	3.078019
Log returns Daily	0.0296813 %	0.009645192	-1.016242	30.40106
Log returns Monthly	0.6223253 %	0.0412572	-0.6678307	5.531857
Log returns Yearly	7.467903 %	0.1618273	-0.9589001	4.193338

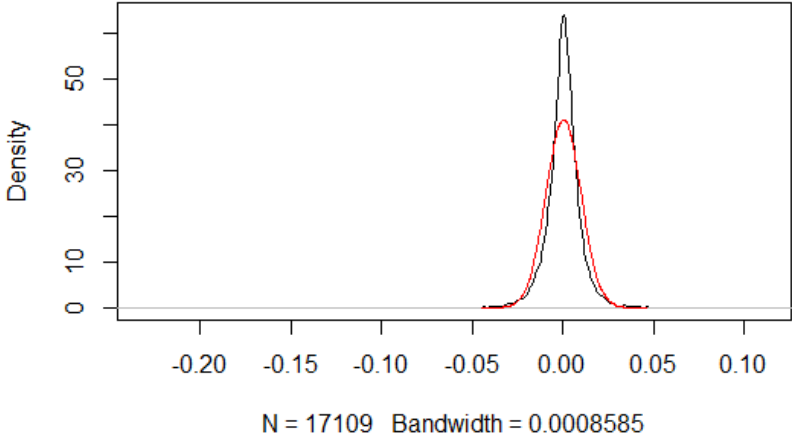
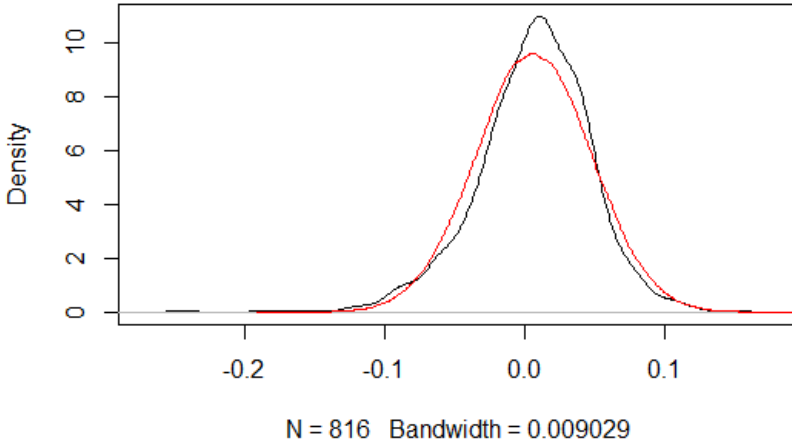
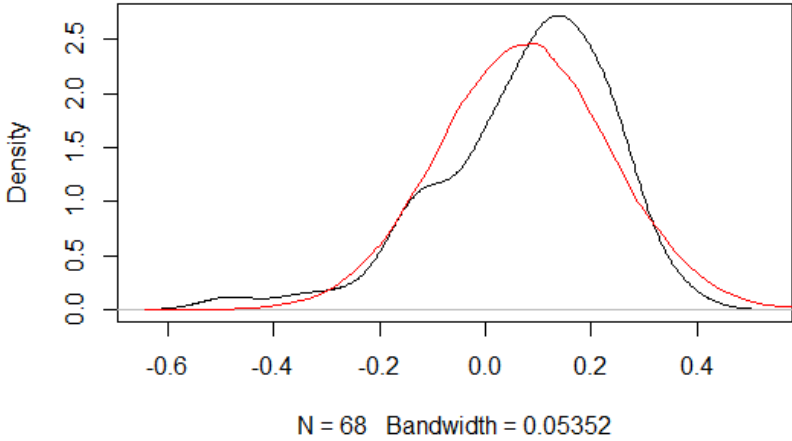
Question 2 – Russell 2000

Time series	Sample Mean	Sample Std Dev	Sample Skewness	Sample Kurtosis
Returns Daily	0.04140406 %	0.01268298	-0.230769	9.647057
Returns Monthly	0.8440984 %	0.05287949	-0.5229669	4.159285
Returns Yearly	10.3712 %	0.1842329	-0.3543695	3.081865
Log returns Daily	0.03333832 %	0.01270516	-0.3969321	9.987913
Log returns Monthly	0.7001046 %	0.05342805	-0.7655969	4.748311
Log returns Yearly	8.401256 %	0.17867	-0.8841062	3.870639

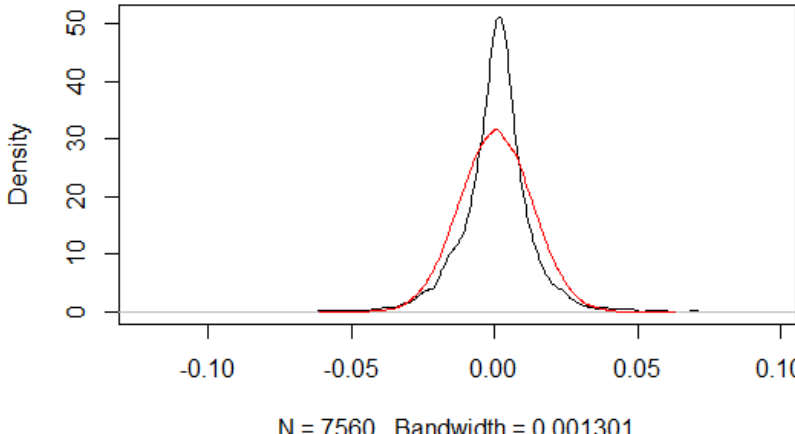
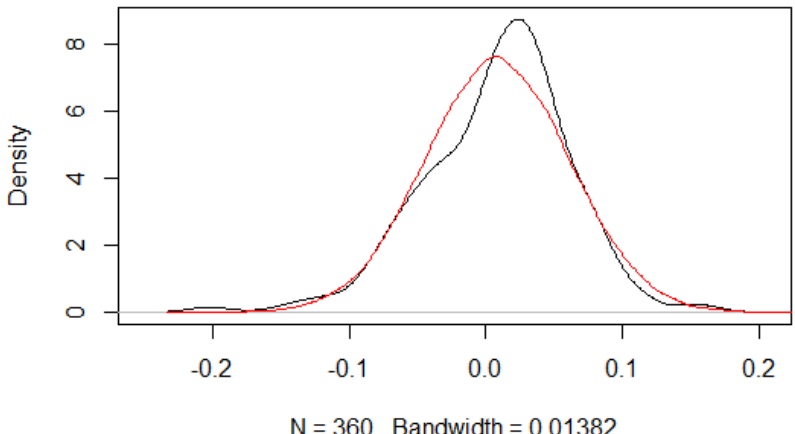
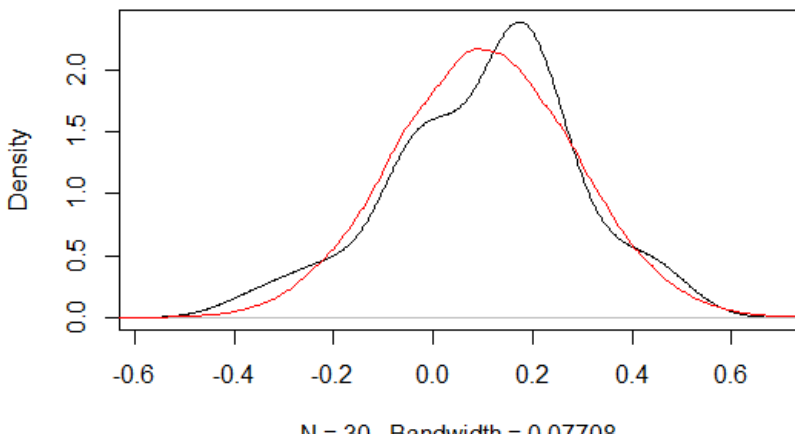
Question 3 – S&P 500

Time series	Plot of probability density function & normal pdf	Are returns normally distributed?
Returns Daily	<p>Density function for S&P 500 Daily returns</p>  <p>N = 17109 Bandwidth = 0.0008589</p>	Yes
Returns Monthly	<p>Density function for S&P 500 Monthly returns</p>  <p>N = 816 Bandwidth = 0.009106</p>	Yes
Returns Yearly	<p>Density function for S&P 500 Yearly returns</p>  <p>N = 68 Bandwidth = 0.05869</p>	No

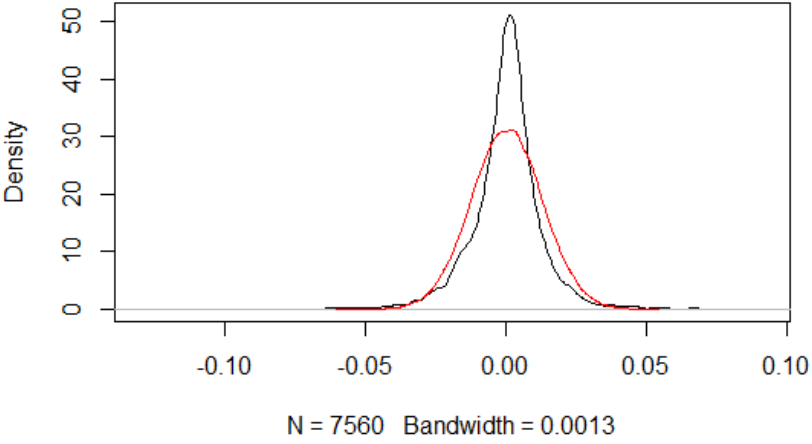
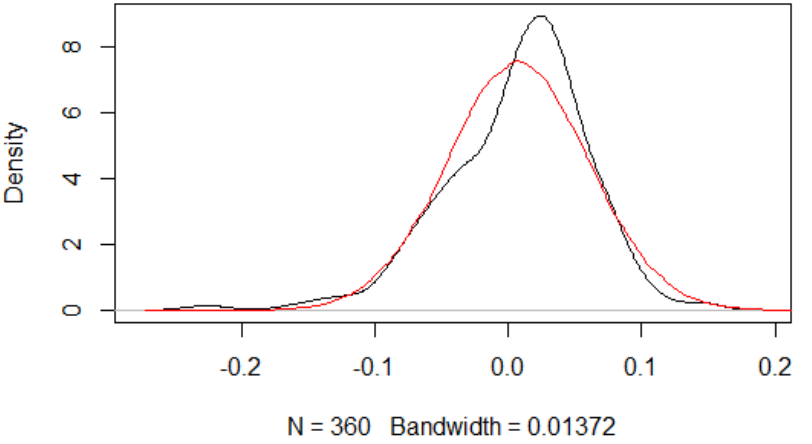
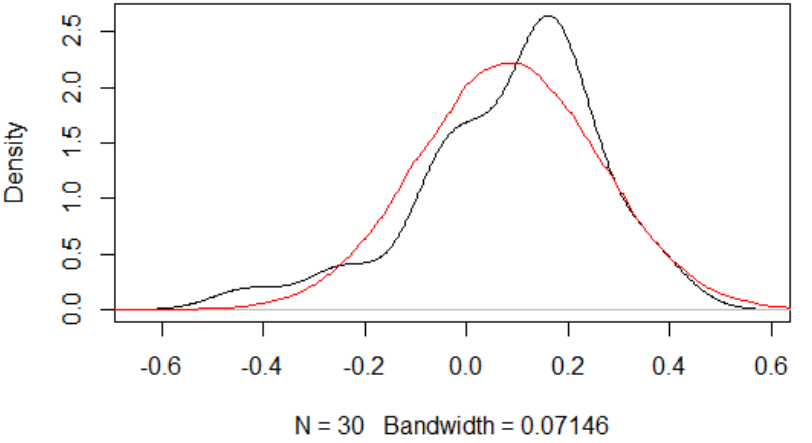
Question 3 – S&P 500

Time series	Plot of probability density function & normal pdf	Are returns normally distributed?
Log returns Daily	<p>Density function for S&P 500 Daily log returns</p>  <p>N = 17109 Bandwidth = 0.0008585</p>	Yes
Log returns Monthly	<p>Density function for S&P 500 Monthly log returns</p>  <p>N = 816 Bandwidth = 0.009029</p>	Yes
Log returns Yearly	<p>Density function for S&P 500 Yearly log returns</p>  <p>N = 68 Bandwidth = 0.05352</p>	Yes

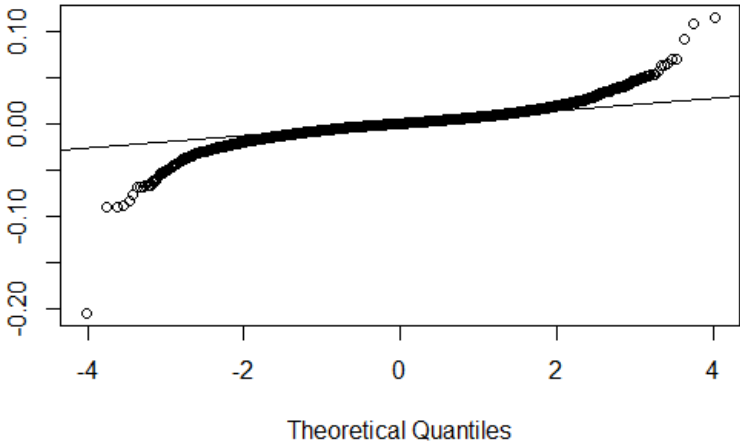
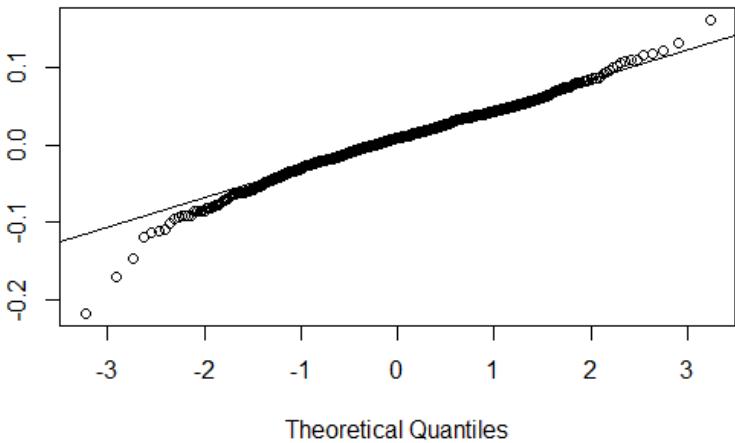
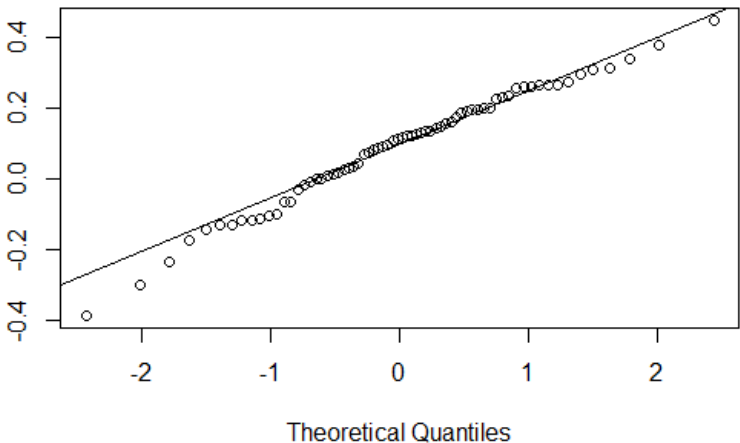
Question 3 – Russell 2000

Time series	Plot of probability density function & normal pdf	Are returns normally distributed?
Returns Daily	<p>Density function for Russell 2000 Daily returns</p>  <p>N = 7560 Bandwidth = 0.001301</p>	Yes
Returns Monthly	<p>Density function for Russell 2000 Monthly returns</p>  <p>N = 360 Bandwidth = 0.01382</p>	Yes
Returns Yearly	<p>Density function for Russell 2000 Yearly returns</p>  <p>N = 30 Bandwidth = 0.07708</p>	No

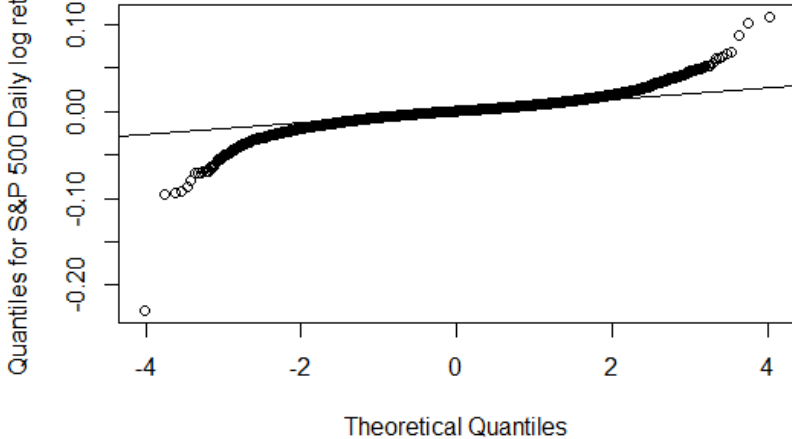
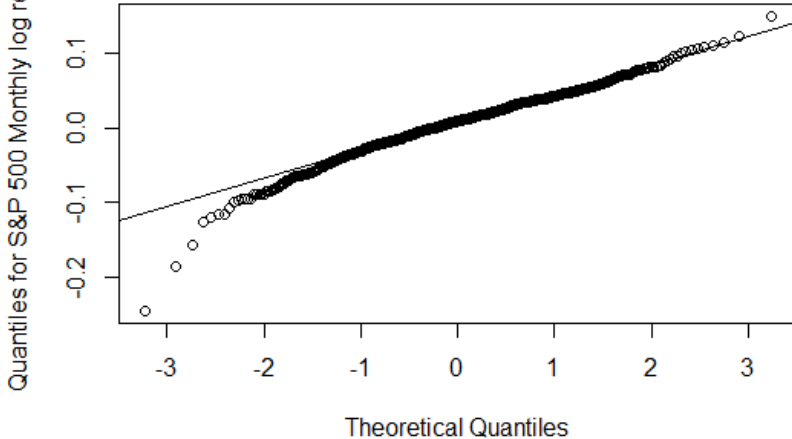
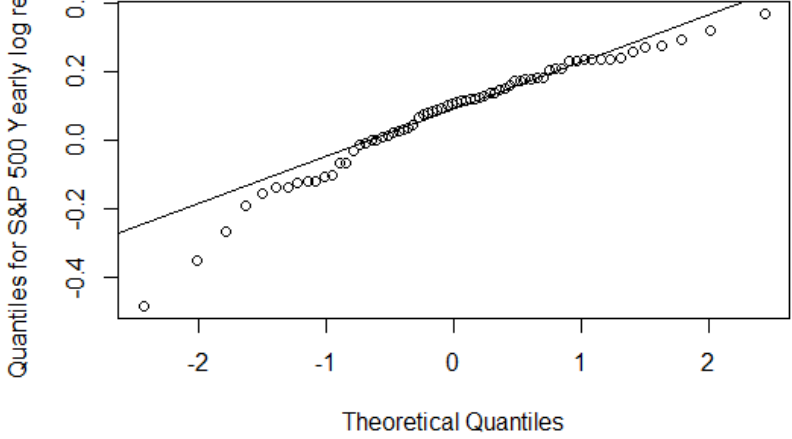
Question 3 – Russell 2000

Time series	Plot of probability density function & normal pdf	Are returns normally distributed?
Log returns Daily	<p>Density function for Russell 2000 Daily log returns</p>  <p>N = 7560 Bandwidth = 0.0013</p>	Yes
Log returns Monthly	<p>Density function for Russell 2000 Monthly log returns</p>  <p>N = 360 Bandwidth = 0.01372</p>	Yes
Log returns Yearly	<p>Density function for Russell 2000 Yearly log returns</p>  <p>N = 30 Bandwidth = 0.07146</p>	No

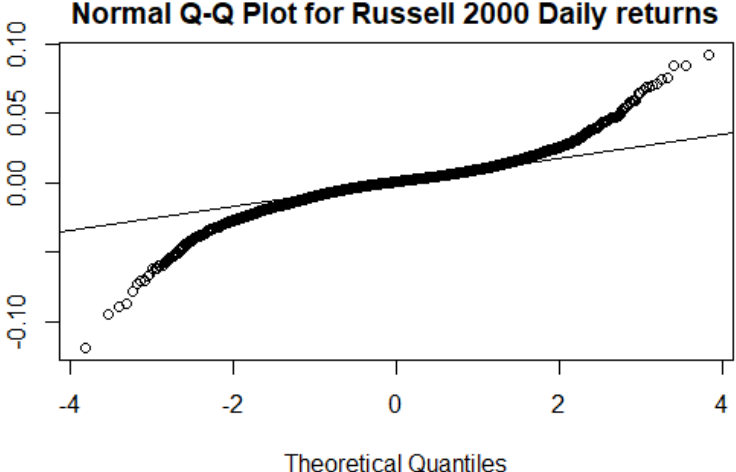
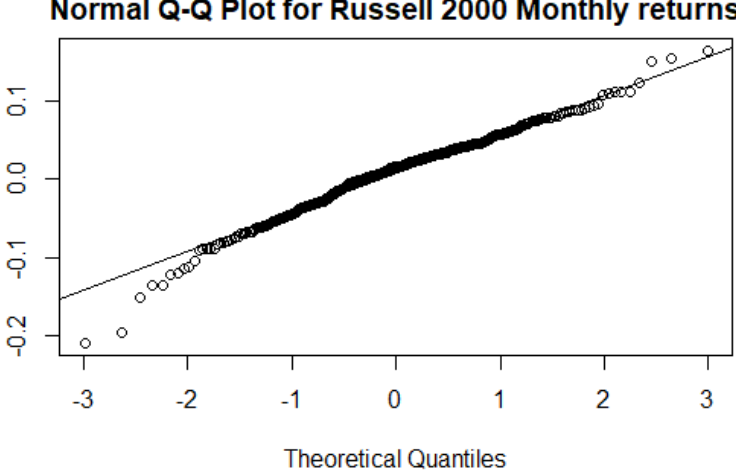
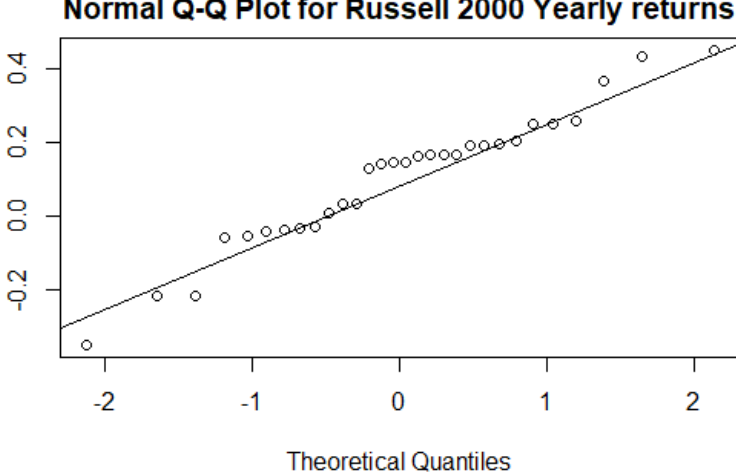
Question 4 – S&P 500

Time series	QQ-plot	Are returns normally distributed?
Returns Daily	<p>Normal Q-Q Plot for S&P 500 Daily returns</p>  <p>Quantiles for S&P 500 Daily returns</p> <p>Theoretical Quantiles</p>	No
Returns Monthly	<p>Normal Q-Q Plot for S&P 500 Monthly returns</p>  <p>Quantiles for S&P 500 Monthly returns</p> <p>Theoretical Quantiles</p>	Yes
Returns Yearly	<p>Normal Q-Q Plot for S&P 500 Yearly returns</p>  <p>Quantiles for S&P 500 Yearly returns</p> <p>Theoretical Quantiles</p>	Yes

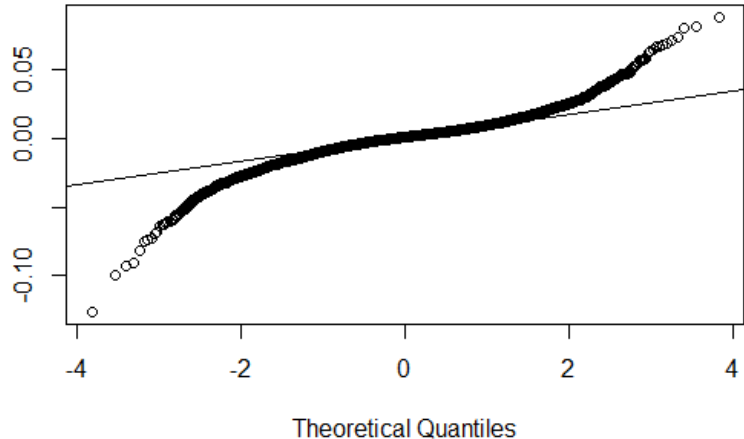
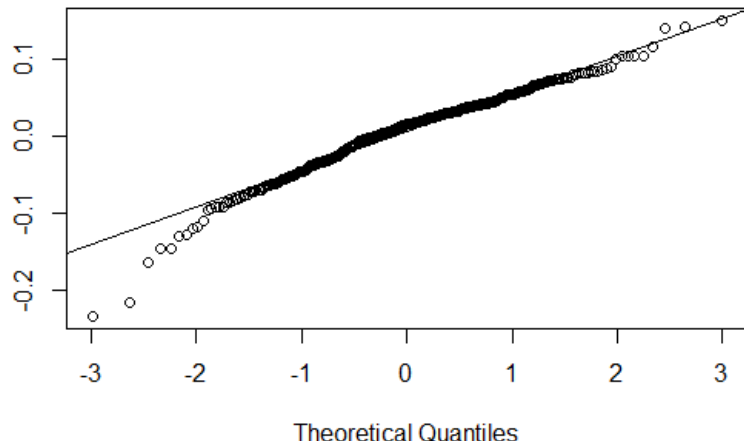
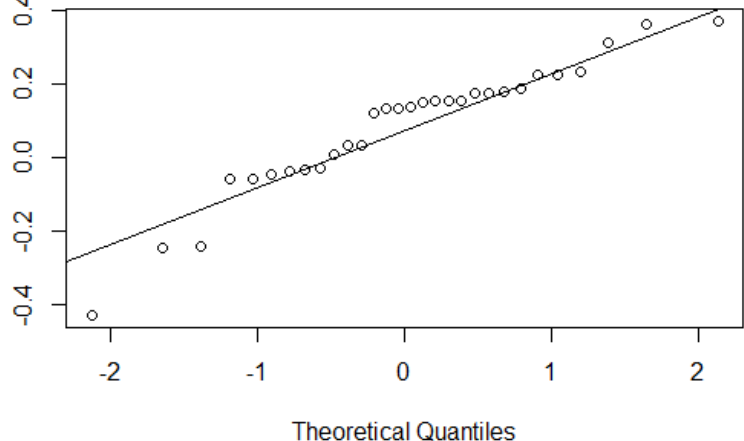
Question 4 – S&P 500

Time series	QQ-plot	Are returns normally distributed?
Log returns Daily	<p>Normal Q-Q Plot for S&P 500 Daily log returns</p>  <p>Quantiles for S&P 500 Daily log returns</p> <p>Theoretical Quantiles</p>	No
Log returns Monthly	<p>Normal Q-Q Plot for S&P 500 Monthly log returns</p>  <p>Quantiles for S&P 500 Monthly log returns</p> <p>Theoretical Quantiles</p>	Yes
Log returns Yearly	<p>Normal Q-Q Plot for S&P 500 Yearly log returns</p>  <p>Quantiles for S&P 500 Yearly log returns</p> <p>Theoretical Quantiles</p>	No

Question 4 – Russell 2000

Time series	QQ-plot	Are returns normally distributed?
Returns Daily	<p>Quantiles for Russell 2000 Daily returns</p>  <p>Normal Q-Q Plot for Russell 2000 Daily returns</p> <p>Theoretical Quantiles</p>	No
Returns Monthly	<p>Quantiles for Russell 2000 Monthly returns</p>  <p>Normal Q-Q Plot for Russell 2000 Monthly returns</p> <p>Theoretical Quantiles</p>	Yes
Returns Yearly	<p>Quantiles for Russell 2000 Yearly returns</p>  <p>Normal Q-Q Plot for Russell 2000 Yearly returns</p> <p>Theoretical Quantiles</p>	Yes

Question 4 – Russell 2000

Time series	QQ-plot	Are returns normally distributed?
Log returns Daily	<p>Normal Q-Q Plot for Russell 2000 Daily log returns</p>  <p>Quantiles for Russell 2000 Daily log returns</p> <p>Theoretical Quantiles</p>	No
Log returns Monthly	<p>Normal Q-Q Plot for Russell 2000 Monthly log returns</p>  <p>Quantiles for Russell 2000 Monthly log returns</p> <p>Theoretical Quantiles</p>	Yes
Log returns Yearly	<p>Normal Q-Q Plot for Russell 2000 Yearly log returns</p>  <p>Quantiles for Russell 2000 Yearly log returns</p> <p>Theoretical Quantiles</p>	Yes

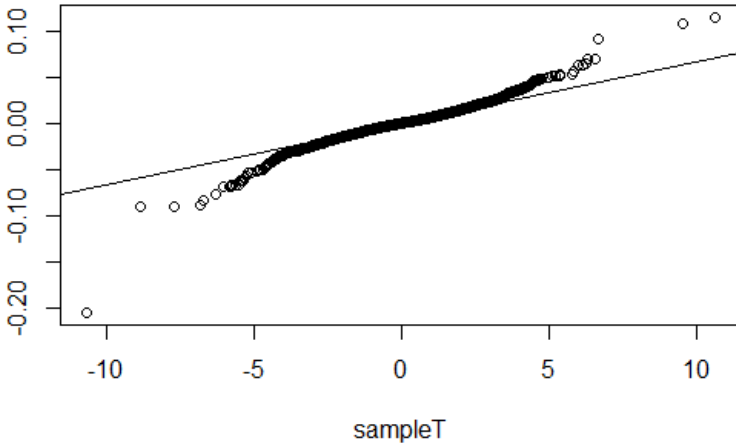
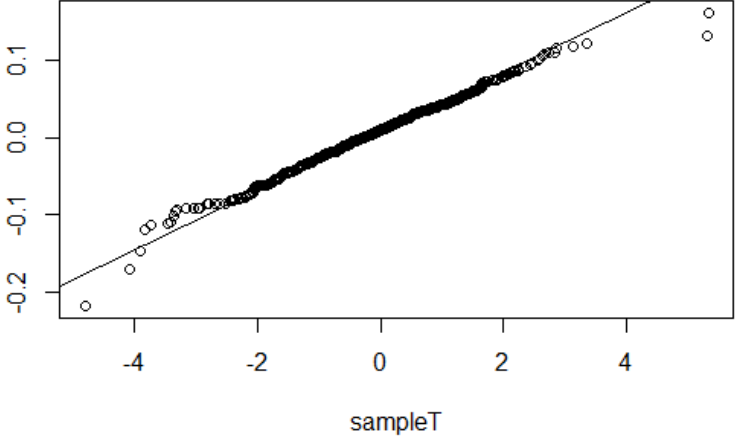
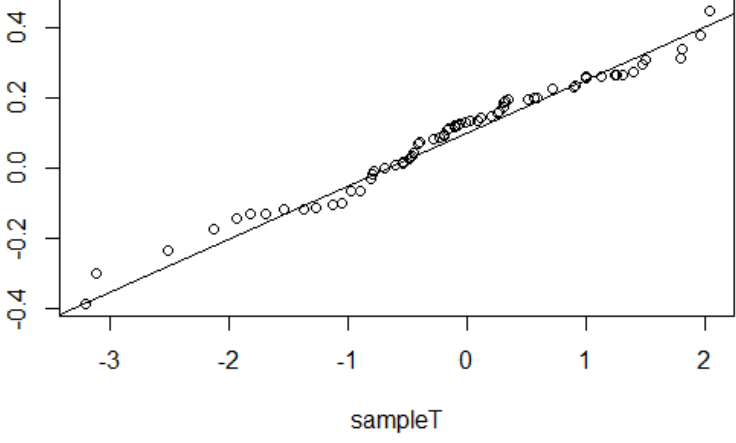
Question 5 – S&P 500

Time series	P-value	Can you reject null hypothesis of a normal distribution at 0.01?
Returns Daily	2.2e-16	No
Returns Monthly	2.36e-08	No
Returns Yearly	0.4282	Yes
Log returns Daily	2.2e-16	No
Log returns Monthly	3.145e-11	No
Log returns Yearly	0.005177	No

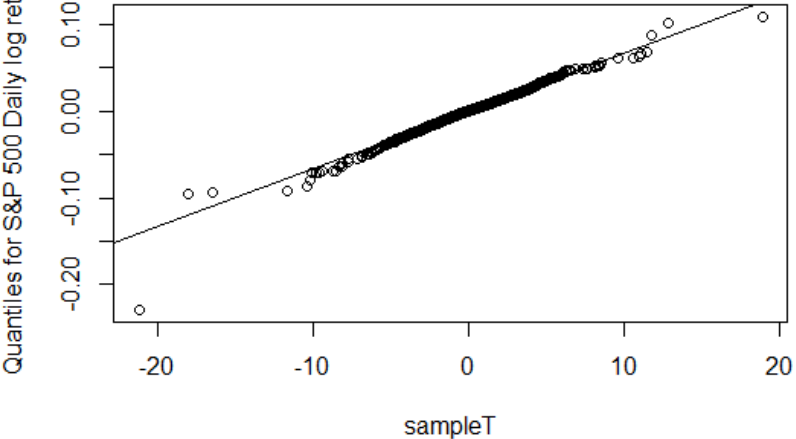
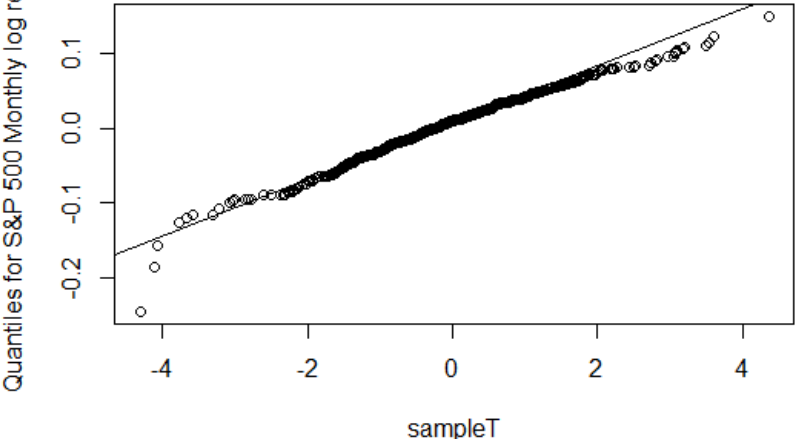
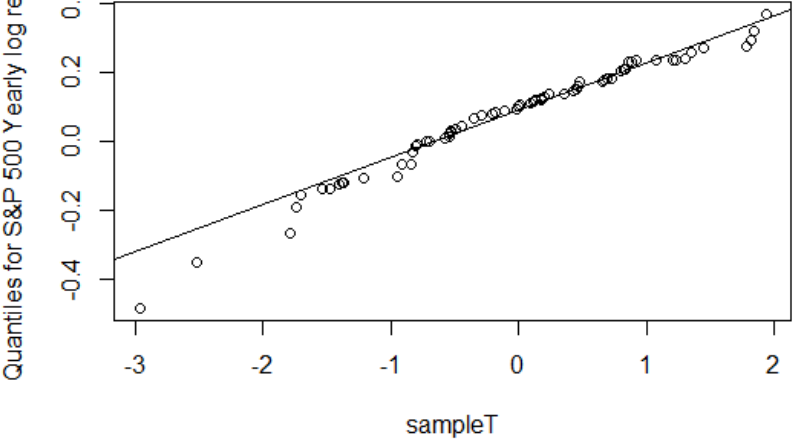
Question 5 – Russell 2000

Time series	P-value	Can you reject null hypothesis of a normal distribution at 0.01?
Returns Daily	2.2e-16	No
Returns Monthly	6.008e-05	No
Returns Yearly	0.3176	Yes
Log returns Daily	2.2e-16	No
Log returns Monthly	2.663e-07	No
Log returns Yearly	0.04078	Yes

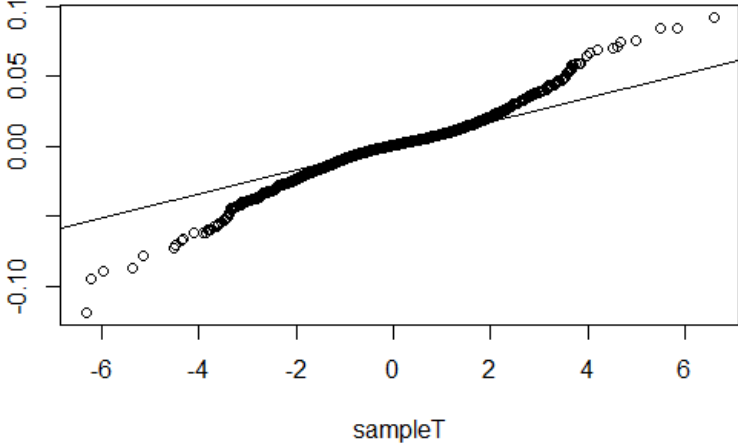
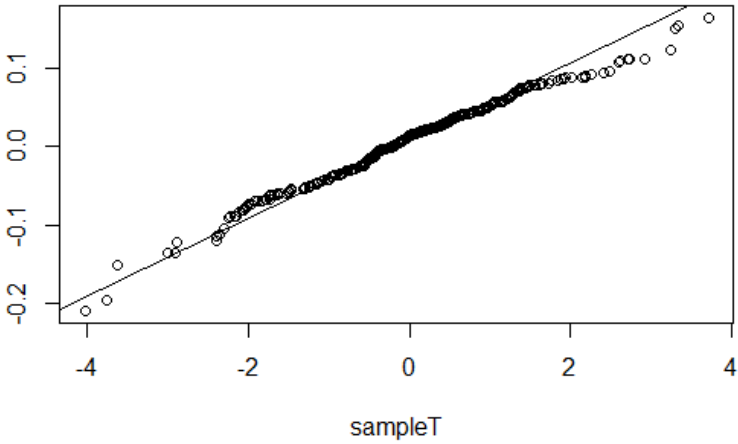
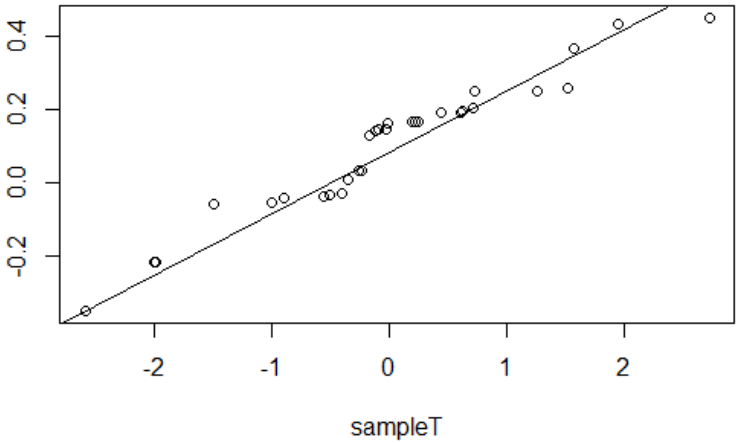
Question 6 – S&P 500

Time series	QQ-plot with best t-distribution	Degrees of freedom best t-distribution
Returns Daily	<p>T-distribution for S&P 500 Daily returns with 6 df</p> 	6
Returns Monthly	<p>T-distribution for S&P 500 Monthly returns with 8 df</p> 	8
Returns Yearly	<p>T-distribution for S&P 500 Yearly returns with 4 df</p> 	4

Question 6 – S&P 500

Time series	QQ-plot with best t-distribution	Degrees of freedom best t-distribution
Log returns Daily	<p>T-distribution for S&P 500 Daily log returns with 4 df</p> 	4
Log returns Monthly	<p>T-distribution for S&P 500 Monthly log returns with 8 df</p> 	8
Log returns Yearly	<p>T-distribution for S&P 500 Yearly log returns with 7 df</p> 	7

Question 6 – Russell 2000

Time series	QQ-plot with best t-distribution	Degrees of freedom best t-distribution
Returns Daily	<p>T-distribution for Russell 2000 Daily returns with 8 df</p> 	8
Returns Monthly	<p>T-distribution for Russell 2000 Monthly returns with 6 df</p> 	6
Returns Yearly	<p>T-distribution for Russell 2000 Yearly returns with 7 df</p> 	7

Question 6 – Russell 2000

Time series	QQ-plot with best t-distribution	Degrees of freedom best t-distribution
Log returns Daily	<p>T-distribution for Russell 2000 Daily log returns with 5 df</p>	5
Log returns Monthly	<p>T-distribution for Russell 2000 Monthly log returns with 8 c</p>	8
Log returns Yearly	<p>T-distribution for Russell 2000 Yearly log returns with 6 df</p>	6