# Question 1 – S&P 500

|  |  |
| --- | --- |
| Time series | **Plot of returns** |
| **Returns Daily** |  |
| **Returns**  **Monthly** |  |
| **Returns Yearly** |  |

# Question 1 – S&P 500

|  |  |
| --- | --- |
| Time series | **Plot of returns** |
| **Log returns**  **Daily** |  |
| **Log returns**  **Monthly** |  |
| **Log returns**  **Yearly** |  |

# Question 1 – Russell 2000

|  |  |
| --- | --- |
| Time series | **Plot of returns** |
| **Returns Daily** |  |
| **Returns**  **Monthly** |  |
| **Returns Yearly** |  |

# Question 1 – Russell 2000

|  |  |
| --- | --- |
| Time series | **Plot of returns** |
| **Log returns**  **Daily** |  |
| **Log returns**  **Monthly** |  |
| **Log returns**  **Yearly** |  |

# 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** |  | Yes |
| **Returns**  **Monthly** |  | Yes |
| **Returns Yearly** |  | No |

# Question 3 – S&P 500

|  |  |  |
| --- | --- | --- |
| Time series | **Plot of probability density function & normal pdf** | **Are returns normally distributed?** |
| **Log returns**  **Daily** |  | Yes |
| **Log returns**  **Monthly** |  | Yes |
| **Log returns**  **Yearly** |  | Yes |

# Question 3 – Russell 2000

|  |  |  |
| --- | --- | --- |
| Time series | **Plot of probability density function & normal pdf** | **Are returns normally distributed?** |
| **Returns Daily** |  | Yes |
| **Returns**  **Monthly** |  | Yes |
| **Returns Yearly** |  | No |

# Question 3 – Russell 2000

|  |  |  |
| --- | --- | --- |
| Time series | **Plot of probability density function & normal pdf** | **Are returns normally distributed?** |
| **Log returns**  **Daily** |  | Yes |
| **Log returns**  **Monthly** |  | Yes |
| **Log returns**  **Yearly** |  | No |

# Question 4 – S&P 500

|  |  |  |
| --- | --- | --- |
| Time series | **QQ-plot** | **Are returns normally distributed?** |
| **Returns Daily** |  | No |
| **Returns**  **Monthly** |  | Yes |
| **Returns Yearly** |  | Yes |

# Question 4 – S&P 500

|  |  |  |
| --- | --- | --- |
| Time series | **QQ-plot** | **Are returns normally distributed?** |
| **Log returns**  **Daily** |  | No |
| **Log returns**  **Monthly** |  | Yes |
| **Log returns**  **Yearly** |  | No |

# Question 4 – Russell 2000

|  |  |  |
| --- | --- | --- |
| Time series | **QQ-plot** | **Are returns normally distributed?** |
| **Returns Daily** |  | No |
| **Returns**  **Monthly** |  | Yes |
| **Returns Yearly** |  | Yes |

# Question 4 – Russell 2000

|  |  |  |
| --- | --- | --- |
| Time series | **QQ-plot** | **Are returns normally distributed?** |
| **Log returns**  **Daily** |  | No |
| **Log returns**  **Monthly** |  | Yes |
| **Log returns**  **Yearly** |  | 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** |  | 6 |
| **Returns**  **Monthly** |  | 8 |
| **Returns Yearly** |  | 4 |

# Question 6 – S&P 500

|  |  |  |
| --- | --- | --- |
| Time series | **QQ-plot with best t-distribution** | **Degrees of freedom best t-distribution** |
| **Log returns**  **Daily** |  | 4 |
| **Log returns**  **Monthly** |  | 8 |
| **Log returns**  **Yearly** |  | 7 |

# Question 6 – Russell 2000

|  |  |  |
| --- | --- | --- |
| Time series | **QQ-plot with best t-distribution** | **Degrees of freedom best t-distribution** |
| **Returns Daily** |  | 8 |
| **Returns**  **Monthly** |  | 6 |
| **Returns Yearly** |  | 7 |

# Question 6 – Russell 2000

|  |  |  |
| --- | --- | --- |
| Time series | **QQ-plot with best t-distribution** | **Degrees of freedom best t-distribution** |
| **Log returns**  **Daily** |  | 5 |
| **Log returns**  **Monthly** |  | 8 |
| **Log returns**  **Yearly** |  | 6 |