

## 2.11 Volatility

Day	Open	High	Low	Close
1	15.02	15.04	14.82	14.84
2	14.83	14.94	14.31	14.64
3	14.62	14.98	14.38	14.58
4	14.47	14.72	14.35	14.63
5	14.59	14.65	14.36	14.56
6	14.55	14.59	14.49	14.57
7	14.54	14.69	14.41	14.49
8	14.48	14.90	14.24	14.49
9	14.45	14.52	14.36	14.49
10	14.46	14.48	14.28	14.34
11	14.36	14.56	14.22	14.35
12	14.37	14.73	14.26	14.29
13	14.27	14.43	14.10	14.16
14	14.14	14.20	14.07	14.10
15	14.13	14.38	14.09	14.18
16	14.21	14.42	14.04	14.19
17	14.21	14.41	14.03	14.12
18	14.13	14.60	14.10	14.43
19	14.41	14.58	14.23	14.45
20	14.46	14.52	14.29	14.44

SOLUTION:

$i$	$\left(\ln \frac{H_i}{L_i}\right)^2$	$\left[\frac{1}{2} \left(\ln \frac{H_i}{L_i}\right)^2 - (2 \ln 2 - 1) \times \left(\ln \frac{C_i}{O_i}\right)^2\right]$
1	0.00021714	0.00005242
2	0.00185620	0.00086387
3	0.00167098	0.00083259
4	0.00064807	0.00027732
5	0.00039975	0.00019824
6	0.00004730	0.00002292
7	0.00037035	0.00018059
8	0.00205266	0.00102615
9	0.00012278	0.00005844
10	0.00019344	0.00006990
11	0.00055831	0.00027897
12	0.00105156	0.00051374
13	0.00053521	0.00024447
14	0.00008459	0.00003919
15	0.00041506	0.00020271
16	0.00071320	0.00035583
17	0.00071420	0.00034151
18	0.00121429	0.00043664
19	0.00059041	0.00029224
20	0.00025495	0.00012673

Daily Parkinson volatility = 0.0153.

Daily Garman-Klass volatility = 0.0175.

Annualized Parkinson volatility = 0.2932.

Annualized Garman-Klass volatility = 0.3339.