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LAMPIRAN

Lampiran 1. Data Harga Penutupan Saham Periode Juli 2023 – Juli 2024

Date	Close	Date	Close	Date	Close
7/3/2023	5475	8/23/2023	5600	10/12/2023	5300
7/4/2023	5450	8/24/2023	5550	10/13/2023	5275
7/5/2023	5450	8/25/2023	5600	10/16/2023	5250
7/6/2023	5425	8/28/2023	5550	10/17/2023	5150
7/7/2023	5375	8/29/2023	5600	10/18/2023	5150
7/10/2023	5400	8/30/2023	5525	10/19/2023	5000
7/11/2023	5425	8/31/2023	5550	10/20/2023	5050
7/12/2023	5450	9/1/2023	5575	10/23/2023	5000
7/13/2023	5450	9/4/2023	5625	10/24/2023	5100
7/14/2023	5525	9/5/2023	5625	10/25/2023	5175
7/17/2023	5575	9/6/2023	5575	10/26/2023	4920
7/18/2023	5625	9/7/2023	5450	10/27/2023	5000
7/20/2023	5625	9/8/2023	5350	10/30/2023	5000
7/21/2023	5625	9/11/2023	5425	10/31/2023	4960
7/24/2023	5600	9/12/2023	5375	11/1/2023	4830
7/25/2023	5650	9/13/2023	5400	11/2/2023	5000
7/26/2023	5675	9/14/2023	5425	11/3/2023	5100
7/27/2023	5650	9/15/2023	5375	11/6/2023	5200
7/28/2023	5700	9/18/2023	5325	11/7/2023	5250
7/31/2023	5650	9/19/2023	5375	11/8/2023	5225
8/1/2023	5700	9/20/2023	5375	11/9/2023	5200
8/2/2023	5700	9/21/2023	5350	11/10/2023	5075
8/3/2023	5700	9/22/2023	5350	11/13/2023	5025
8/4/2023	5575	9/25/2023	5300	11/14/2023	5075
8/7/2023	5700	9/26/2023	5200	11/15/2023	5250
8/8/2023	5625	9/27/2023	5225	11/16/2023	5250
8/9/2023	5700	9/29/2023	5225	11/17/2023	5225
8/10/2023	5700	10/2/2023	5250	11/20/2023	5250
8/11/2023	5650	10/3/2023	5275	11/21/2023	5200
8/14/2023	5650	10/4/2023	5250	11/22/2023	5275
8/15/2023	5575	10/5/2023	5175	11/23/2023	5350
8/16/2023	5525	10/6/2023	5175	11/24/2023	5400
8/18/2023	5575	10/9/2023	5125	11/27/2023	5350
8/21/2023	5500	10/10/2023	5175	11/28/2023	5350
8/22/2023	5575	10/11/2023	5250	11/29/2023	5300

Date	Close	Date	Close	Date	Close
11/30/2023	5275	1/23/2024	5700	3/19/2024	6000
12/1/2023	5350	1/24/2024	5650	3/20/2024	6100
12/4/2023	5500	1/25/2024	5525	3/21/2024	6100
12/5/2023	5450	1/26/2024	5425	3/22/2024	6125
12/6/2023	5425	1/29/2024	5575	3/25/2024	6250
12/7/2023	5475	1/30/2024	5625	3/26/2024	6300
12/8/2023	5375	1/31/2024	5700	3/27/2024	6250
12/11/2023	5300	2/1/2024	5750	3/28/2024	6050
12/12/2023	5325	2/2/2024	5850	4/1/2024	5925
12/13/2023	5300	2/5/2024	5775	4/2/2024	5675
12/14/2023	5550	2/6/2024	5825	4/3/2024	5625
12/15/2023	5550	2/7/2024	5850	4/4/2024	5700
12/18/2023	5500	2/12/2024	6025	4/5/2024	5650
12/19/2023	5550	2/13/2024	6000	4/16/2024	5350
12/20/2023	5550	2/15/2024	6125	4/17/2024	5300
12/21/2023	5575	2/16/2024	6150	4/18/2024	5475
12/22/2023	5675	2/19/2024	6100	4/19/2024	5275
12/27/2023	5625	2/20/2024	6300	4/22/2024	5300
12/28/2023	5725	2/21/2024	6300	4/23/2024	5300
12/29/2023	5725	2/22/2024	6250	4/24/2024	5225
1/2/2024	5675	2/23/2024	6125	4/25/2024	5150
1/3/2024	5600	2/26/2024	6175	4/26/2024	4830
1/4/2024	5700	2/27/2024	6125	4/29/2024	4770
1/5/2024	5750	2/28/2024	6225	4/30/2024	4940
1/8/2024	5625	2/29/2024	6125	5/2/2024	4760
1/9/2024	5700	3/1/2024	6125	5/3/2024	4750
1/10/2024	5700	3/4/2024	6050	5/6/2024	4790
1/11/2024	5750	3/5/2024	6125	5/7/2024	4670
1/12/2024	5850	3/6/2024	6200	5/8/2024	4680
1/15/2024	5825	3/7/2024	6225	5/13/2024	4680
1/16/2024	5825	3/8/2024	6350	5/14/2024	4730
1/17/2024	5775	3/13/2024	6400	5/15/2024	4820
1/18/2024	5750	3/14/2024	6150	5/16/2024	4840
1/19/2024	5800	3/15/2024	5975	5/17/2024	4920
1/22/2024	5775	3/18/2024	6000	5/20/2024	4820

Date	Close
5/21/2024	4680
5/22/2024	4720
5/27/2024	4550
5/28/2024	4530
5/29/2024	4410
5/30/2024	4380
5/31/2024	4340
6/3/2024	4530
6/4/2024	4450
6/5/2024	4400
6/6/2024	4500
6/7/2024	4350
6/10/2024	4400
6/11/2024	4340
6/12/2024	4350
6/13/2024	4310
6/14/2024	4180
6/19/2024	4100
6/20/2024	4270
6/21/2024	4440
6/24/2024	4400
6/25/2024	4380
6/26/2024	4370
6/27/2024	4460
6/28/2024	4600

Lampiran 2. Harga *Return* (R_t)

Date	Harga Penutupan (S_t)	Return (R_t)
7/3/2023	5475	0.0091744
7/4/2023	5450	-0.004577
7/5/2023	5450	0
7/6/2023	5425	-0.004598
7/7/2023	5375	-0.009259
7/10/2023	5400	0.0046404
7/11/2023	5425	0.0046189
7/12/2023	5450	0.0045977
7/13/2023	5450	0
7/14/2023	5525	0.0136676
7/17/2023	5575	0.0090091
7/18/2023	5625	0.0089286
7/20/2023	5625	0
7/21/2023	5625	0
7/24/2023	5600	-0.004454
7/25/2023	5650	0.0088889
7/26/2023	5675	0.004415
7/27/2023	5650	-0.004415
7/28/2023	5700	0.0088106
7/31/2023	5650	-0.008811
8/1/2023	5700	0.0088106
8/2/2023	5700	0
8/3/2023	5700	0
8/4/2023	5575	-0.022174
8/7/2023	5700	0.0221739
8/8/2023	5625	-0.013245
8/9/2023	5700	0.0132452
8/10/2023	5700	0
8/11/2023	5650	-0.008811
8/14/2023	5650	0
8/15/2023	5575	-0.013363
8/16/2023	5525	-0.009009
8/18/2023	5575	0.0090091

Date	Harga Penutupan (S_t)	Return (R_t)
8/21/2023	5500	-0.013544
8/22/2023	5575	0.0135442
8/23/2023	5600	0.0044743
8/24/2023	5550	-0.008969
8/25/2023	5600	0.0089687
8/28/2023	5550	-0.008969
8/29/2023	5600	0.0089687
8/30/2023	5525	-0.013483
8/31/2023	5550	0.0045147
9/1/2023	5575	0.0044944
9/4/2023	5625	0.0089286
9/5/2023	5625	0
9/6/2023	5575	-0.008929
9/7/2023	5450	-0.022677
9/8/2023	5350	-0.018519
9/11/2023	5425	0.0139213
9/12/2023	5375	-0.009259
9/13/2023	5400	0.0046404
9/14/2023	5425	0.0046189
9/15/2023	5375	-0.009259
9/18/2023	5325	-0.009346
9/19/2023	5375	0.0093459
9/20/2023	5375	0
9/21/2023	5350	-0.004662
9/22/2023	5350	0
9/25/2023	5300	-0.00939
9/26/2023	5200	-0.019048
9/27/2023	5225	0.0047962
9/29/2023	5225	0
10/2/2023	5250	0.0047733
10/3/2023	5275	0.0047506
10/4/2023	5250	-0.004751

Date	Harga Penutupan (S_t)	Return (R_t)
10/5/2023	5175	-0.014389
10/6/2023	5175	0
10/9/2023	5125	-0.009709
10/10/2023	5175	0.0097088
10/11/2023	5250	0.0143887
10/12/2023	5300	0.0094787
10/13/2023	5275	-0.004728
10/16/2023	5250	-0.004751
10/17/2023	5150	-0.019231
10/18/2023	5150	0
10/19/2023	5000	-0.029559
10/20/2023	5050	0.0099503
10/23/2023	5000	-0.00995
10/24/2023	5100	0.0198026
10/25/2023	5175	0.0145988
10/26/2023	4920	-0.050531
10/27/2023	5000	0.0161294
10/30/2023	5000	0
10/31/2023	4960	-0.008032
11/1/2023	4830	-0.026559
11/2/2023	5000	0.0345914
11/3/2023	5100	0.0198026
11/6/2023	5200	0.0194181
11/7/2023	5250	0.0095695
11/8/2023	5225	-0.004773
11/9/2023	5200	-0.004796
11/10/2023	5075	-0.024332
11/13/2023	5025	-0.009901
11/14/2023	5075	0.0099011
11/15/2023	5250	0.0339016
11/16/2023	5250	0
11/17/2023	5225	-0.004773
11/20/2023	5250	0.0047733
11/21/2023	5200	-0.009569
11/22/2023	5275	0.0143201
11/23/2023	5350	0.0141179
11/24/2023	5400	0.0093024

Date	Harga Penutupan (S_t)	Return (R_t)
11/27/2023	5350	-0.009302
11/28/2023	5350	0
11/29/2023	5300	-0.00939
11/30/2023	5275	-0.004728
12/1/2023	5350	0.0141179
12/4/2023	5500	0.0276515
12/5/2023	5450	-0.009132
12/6/2023	5425	-0.004598
12/7/2023	5475	0.0091744
12/8/2023	5375	-0.018434
12/11/2023	5300	-0.014052
12/12/2023	5325	0.0047059
12/13/2023	5300	-0.004706
12/14/2023	5550	0.0460911
12/15/2023	5550	0
12/18/2023	5500	-0.00905
12/19/2023	5550	0.0090498
12/20/2023	5550	0
12/21/2023	5575	0.0044944
12/22/2023	5675	0.0177782
12/27/2023	5625	-0.00885
12/28/2023	5725	0.0176216
12/29/2023	5725	0
1/2/2024	5675	-0.008772
1/3/2024	5600	-0.013304
1/4/2024	5700	0.0176996
1/5/2024	5750	0.0087337
1/8/2024	5625	-0.021979
1/9/2024	5700	0.0132452
1/10/2024	5700	0
1/11/2024	5750	0.0087337
1/12/2024	5850	0.0172418
1/15/2024	5825	-0.004283
1/16/2024	5825	0
1/17/2024	5775	-0.008621
1/18/2024	5750	-0.004338

Date	Harga Penutupan (S_t)	Return (R_t)
1/19/2024	5800	0.0086581
1/22/2024	5775	-0.00432
1/23/2024	5700	-0.013072
1/24/2024	5650	-0.008811
1/25/2024	5525	-0.022372
1/26/2024	5425	-0.018265
1/29/2024	5575	0.0272744
1/30/2024	5625	0.0089286
1/31/2024	5700	0.0132452
2/1/2024	5750	0.0087337
2/2/2024	5850	0.0172418
2/5/2024	5775	-0.012903
2/6/2024	5825	0.0086207
2/7/2024	5850	0.0042827
2/12/2024	6025	0.0294758
2/13/2024	6000	-0.004158
2/15/2024	6125	0.0206193
2/16/2024	6150	0.0040733
2/19/2024	6100	-0.008163
2/20/2024	6300	0.0322609
2/21/2024	6300	0
2/22/2024	6250	-0.007968
2/23/2024	6125	-0.020203
2/26/2024	6175	0.0081301
2/27/2024	6125	-0.00813
2/28/2024	6225	0.0161947
2/29/2024	6125	-0.016195
3/1/2024	6125	0
3/4/2024	6050	-0.01232
3/5/2024	6125	0.0123205
3/6/2024	6200	0.0121705
3/7/2024	6225	0.0040242
3/8/2024	6350	0.0198814
3/13/2024	6400	0.0078432

Date	Harga Penutupan (S_t)	Return (R_t)
3/14/2024	6150	-0.039846
3/15/2024	5975	-0.028868
3/18/2024	6000	0.0041754
3/19/2024	6000	0
3/20/2024	6100	0.0165293
3/21/2024	6100	0
3/22/2024	6125	0.00409
3/25/2024	6250	0.0202027
3/26/2024	6300	0.0079682
3/27/2024	6250	-0.007968
3/28/2024	6050	-0.032523
4/1/2024	5925	-0.020878
4/2/2024	5675	-0.04311
4/3/2024	5625	-0.00885
4/4/2024	5700	0.0132452
4/5/2024	5650	-0.008811
4/16/2024	5350	-0.054559
4/17/2024	5300	-0.00939
4/18/2024	5475	0.0324855
4/19/2024	5275	-0.037214
4/22/2024	5300	0.0047281
4/23/2024	5300	0
4/24/2024	5225	-0.014252
4/25/2024	5150	-0.014458
4/26/2024	4830	-0.06415
4/29/2024	4770	-0.0125
4/30/2024	4940	0.035019
5/2/2024	4760	-0.037118
5/3/2024	4750	-0.002103
5/6/2024	4790	0.0083858
5/7/2024	4670	-0.025371
5/8/2024	4680	0.002139
5/13/2024	4680	0
5/14/2024	4730	0.0106271
5/15/2024	4820	0.0188487
5/16/2024	4840	0.0041408

Date	Harga Penutupan (S_t)	Return (R_t)
5/17/2024	4920	0.0163938
5/20/2024	4820	-0.020535
5/21/2024	4680	-0.029476
5/22/2024	4720	0.0085107
5/27/2024	4550	-0.036682
5/28/2024	4530	-0.004405
5/29/2024	4410	-0.026847
5/30/2024	4380	-0.006826
5/31/2024	4340	-0.009174
6/3/2024	4530	0.0428476
6/4/2024	4450	-0.017818
6/5/2024	4400	-0.0113
6/6/2024	4500	0.0224729
6/7/2024	4350	-0.033902
6/10/2024	4400	0.0114287
6/11/2024	4340	-0.01373
6/12/2024	4350	0.0023015
6/13/2024	4310	-0.009238
6/14/2024	4180	-0.030627
6/19/2024	4100	-0.019324
6/20/2024	4270	0.0406269
6/21/2024	4440	0.0390405
6/24/2024	4400	-0.00905
6/25/2024	4380	-0.004556
6/26/2024	4370	-0.002286
6/27/2024	4460	0.0203858
6/28/2024	4600	0.0309075

Lampiran 3. Script Grafik Harian Harga Penutupan Saham

```
import yfinance as yf
import matplotlib.pyplot as plt
import pandas as pd

# Pilih ticker saham yang diinginkan
ticker = 'BBRI.JK'  # Ticker untuk Bank BRI di Yahoo Finance

# Tentukan periode
start_date = '2023-07-01'
end_date = '2024-07-01'

# Unduh data saham dalam periode yang ditentukan
data = yf.download(ticker, start=start_date, end=end_date)

# Plot data
plt.figure(figsize=(12, 6))
plt.plot(data.index, data['Close'], marker='o', linestyle='-')
plt.title(f'Pergerakan Harian Saham {ticker}\nPeriode {start_date} hingga {end_date}')
plt.xlabel('Tanggal')
plt.ylabel('Harga Penutupan (IDR)')
plt.grid(True)
plt.xticks(rotation=45)
plt.show()
```

Lampiran 4. Script Penentuan $\phi(d_1)$ dan $\phi(d_2)$

```
clc
% Parameter distribusi normal
mu = 0;         % Rata-rata
sigma = 1;      % Deviasi standar

% Titik data
x = input('Masukkan nilai x: ');

% Menghitung nilai CDF di titik x
cdf_value = normcdf(x, mu, sigma);

% Menampilkan hasil
fprintf('Nilai CDF pada x = %.6f adalah %.6f\n', x, cdf_value);
```

Lampiran 5. Script Matlab Grafik d_i terhadap K

```
% Definisikan variabel K
K = [4500, 4600, 4700, 4800, 4897, 4900, 5000, 5100, 5200];

% Definisikan nilai d1 dan d2 untuk masing-masing K
% Gantilah nilai-nilai ini sesuai dengan data yang Anda
miliki
d1 = [5.031208, 3.720056, 2.437103, 1.181162, -0.012347, -
0.048881, -1.254074, -2.435340, -3.593785];
d2 = [5.047971, 3.736882, 2.453866, 1.197925, 0.004416, -
0.032118, -1.237311, -2.418637, -3.577022];

% Buat grafik
figure;
hold on; % Menjaga agar kedua grafik bisa ditampilkan dalam
satu plot
plot(K, d1, '-o', 'Color', 'r', 'DisplayName', 'Grafik 1
(d1)'); % Garis grafik 1 dengan nilai d1 berwarna merah
plot(K, d2, '-s', 'Color', 'y', 'DisplayName', 'Grafik 2
(d2)'); % Garis grafik 2 dengan nilai d2 berwarna biru

% Tambahkan label, judul, dan legenda
xlabel('K');
ylabel('Nilai');
title('Grafik Nilai d1 dan d2 terhadap K');
legend('show');
grid on; % Menampilkan grid pada grafik

hold off;
```

Lampiran 6. Script Matlab Grafik $\phi(-d_i)$ terhadap K

```
xlabel('$\phi$', 'Interpreter', 'latex')
ylabel('$\phi$', 'Interpreter', 'latex')
title('Grafik $\phi$', 'Interpreter', 'latex')


% Definisikan variabel K
K = [4500, 4600, 4700, 4800, 4897, 4900, 5000, 5100, 5200];

% Definisikan nilai Nd1 dan Nd2 untuk masing-masing K
% Gantilah nilai-nilai ini sesuai dengan data yang Anda
miliki
N_d1 = [0.000000244, 0.0001, 0.007403, 0.118769, 0.504926,
0.519493, 0.895092, 0.992561, 0.999837];
N_d2 = [0.000000223, 0.000093, 0.007066, 0.115473,
0.498238, 0.512811, 0.892014, 0.992211, 0.999826];

% Buat grafik
figure;
hold on; % Menjaga agar kedua grafik bisa ditampilkan dalam
satu plot
plot(K, N_d1, 'Color', 'r', 'DisplayName', 'Grafik 1 (\phi
(-d_1))'); % Garis grafik 1 dengan nilai d1 berwarna merah
plot(K, N_d2, 'Color', 'y', 'DisplayName', 'Grafik 2 (\phi
(-d_2))'); % Garis grafik 2 dengan nilai d2 berwarna biru

% Tambahkan label, judul, dan legenda
xlabel('K');
ylabel('Nilai');
title('Grafik Nilai \phi(-d_1) dan \phi(-d_2) terhadap K');
legend('show');
grid on; % Menampilkan grid pada grafik

hold off;
```

Lampiran 7. Script Matlab Grafik P

```
% Definisikan variabel K
K = [4500, 4600, 4700, 4800, 4897, 4900, 5000, 5100, 5200];

% Definisikan nilai P untuk masing-masing K
P = [0.00000567554, 0.00433009, 0.182432049, 4.375320275,
30.91919051, 32.36010018, 101.0411861, 191.1957221,
284.952081];

% Buat grafik
figure;
plot(K, P, 'Color', 'b', 'DisplayName', 'Grafik P terhadap
K'); % Garis grafik P dengan warna biru

% Tambahkan label, judul, dan legenda
xlabel('K');
ylabel('P');
title('Grafik Nilai P terhadap K');
legend('show');
grid on; % Menampilkan grid pada grafik
```

Lampiran 8. Script Google Colab untuk Uji *Augmented Dickey-Fuller* (ADF)

```
[ ] from google.colab import files
```

```
uploaded = files.upload()
```

```
Choose Files return1.csv
• return1.csv(text/csv) - 4033 bytes, last modified: 9/9/2024 - 100% done
Saving return1.csv to return1.csv
```

```
import pandas as pd

# Ganti 'nama_file.csv' dengan nama file Anda yang diunggah
data = pd.read_csv('return1.csv')

# Misalkan kolom harga penutupan adalah 'Close'
prices = data['return']
```

```
[ ] import pandas as pd
from statsmodels.tsa.stattools import adfuller

# Ganti 'nama_file.csv' dengan nama file Anda yang diunggah
data = pd.read_csv('return1.csv', thousands=',') # Tell pandas to treat commas as thousands separators

# Misalkan kolom harga penutupan adalah 'Close'
prices = data['return']

# Lakukan uji ADF
adf_result = adfuller(prices)

# Cetak hasil uji ADF
print('ADF Statistic: %f' % adf_result[0])
print('p-value: %f' % adf_result[1])
print('Critical Values:')
for key, value in adf_result[4].items():
    print('\t%s: %.3f' % (key, value))
```