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LAMPIRAN

Lampiran 1

$$-\frac{V_i^{n+1}-V_i^n}{\Delta\tau}+\frac{1}{2}\sigma^2S^2\left(\frac{V_{i+1}^n-V_i^n-V_i^{n+1}+V_{i-1}^{n+1}}{\Delta S^2}\right)+(r-q)S\left(\frac{V_{i+1}^n+V_i^n-V_i^{n+1}-V_{i-1}^{n+1}}{2\Delta S}\right)-rV_i^n=0$$

$$-V_i^{n+1}+V_i^n+\frac{1}{2}\sigma^2S^2\Delta\tau\left(\frac{V_{i+1}^n-V_i^n-V_i^{n+1}+V_{i-1}^{n+1}}{\Delta S^2}\right)+(r-q)S\Delta\tau\left(\frac{V_{i+1}^n+V_i^n-V_i^{n+1}-V_{i-1}^{n+1}}{2\Delta S}\right)-r\Delta\tau V_i^n=0$$

misalkan $S=I\Delta S$, maka

$$-V_i^{n+1}+V_i^n+\frac{1}{2}\sigma^2i^2\Delta\tau(V_{i+1}^n-V_i^n-V_i^{n+1}+V_{i-1}^{n+1})+\frac{(r-q)i\Delta\tau}{2}(V_{i+1}^n+V_i^n-V_i^{n+1}-V_{i-1}^{n+1})-r\Delta\tau V_i^n=0$$

$$\left(1+\frac{1}{2}\sigma^2i^2\Delta\tau+\frac{(r-q)i\Delta\tau}{2}\right)V_i^{n+1}=\left(1-\frac{1}{2}\sigma^2i^2\Delta\tau+\frac{(r-q)i\Delta\tau}{2}-r\Delta\tau\right)V_i^n+\left(\frac{1}{2}\sigma^2i^2\Delta\tau+\frac{(r-q)i\Delta\tau}{2}\right)V_{i+1}^n+\left(\frac{1}{2}\sigma^2i^2\Delta\tau-\frac{(r-q)i\Delta\tau}{2}\right)V_{i-1}^{n+1}$$

Missal $\alpha=1+\frac{\sigma^2i^2\Delta\tau+(r-q)i\Delta\tau}{2}$ $\beta=1-\frac{\sigma^2i^2\Delta\tau}{2}+\frac{(r-q)i\Delta\tau}{2}-r\Delta\tau$

$\gamma=\frac{\sigma^2i^2\Delta\tau+(r-q)i\Delta\tau}{2}$ $\delta=\frac{\sigma^2i^2\Delta\tau-(r-q)i\Delta\tau}{2}$

Maka diperoleh

$$\alpha\,V_i^{n+1}=\beta\,V_i^n+\gamma\,V_{i+1}^n+\delta\,V_{i-1}^{n+1}$$

$$\boldsymbol{V_i^{n+1}=\frac{1}{\alpha}\left(\beta\,V_i^n+\gamma\,V_{i+1}^n+\delta\,V_{i-1}^{n+1}\right)}$$

Lampiran 2

$-\frac{V_i^{n+1}-V_i^n}{\Delta\tau}+\frac{1}{2}\sigma^2S^2\left(\frac{V_{i+1}^{n+1}-V_i^{n+1}-V_i^n+V_{i-1}}{\Delta S^2}\right)+(r-q)S\left(\frac{V_{i+1}^{n+1}+V_i^{n+1}-V_i^n-V_{i-1}^n}{2\Delta S}\right)-rV_i^n=0$

$-V_i^{n+1}+V_i^n+\frac{1}{2}\sigma^2S^2\Delta\tau\left(\frac{V_{i+1}^{n+1}-V_i^{n+1}-V_i^n+V_{i-1}}{\Delta S^2}\right)+$
$(r-q)S\Delta\tau\left(\frac{V_{i+1}^{n+1}+V_i^{n+1}-V_i^n-V_{i-1}^n}{2\Delta S}\right)-r\Delta\tau V_i^n=0$

misalkan $S=I\Delta S$, maka

$-V_i^{n+1}+V_i^n+\frac{1}{2}\sigma^2i^2\Delta\tau(V_{i+1}^{n+1}-V_i^{n+1}-V_i^n+V_{i-1}^n)+\frac{(r-q)i\Delta\tau}{2}(V_{i+1}^{n+1}+V_i^{n+1}-V_i^n-V_{i-1}^n)-r\Delta\tau V_i^n=0$

$\left(1+\frac{1}{2}\sigma^2i^2\Delta\tau-\frac{(r-q)i\Delta\tau}{2}\right)V_i^{n+1}=\left(1-\frac{1}{2}\sigma^2i^2\Delta\tau-\frac{(r-q)i\Delta\tau}{2}-r\Delta\tau\right)V_i^n+$
$\left(\frac{1}{2}\sigma^2i^2\Delta\tau-\frac{(r-q)i\Delta\tau}{2}\right)V_{i-1}^n+\left(\frac{1}{2}\sigma^2i^2\Delta\tau+\frac{(r-q)i\Delta\tau}{2}\right)V_{i+1}^{n+1}$

Missal $\alpha=1+\frac{\sigma^2i^2\Delta\tau-(r-q)i\Delta\tau}{2}$ $\quad$ $\beta=1-\frac{\sigma^2i^2\Delta\tau+(r-q)i\Delta\tau}{2}-r\Delta\tau$

$\gamma=\frac{\sigma^2i^2\Delta\tau-(r-q)i\Delta\tau}{2}$ $\quad$ $\delta=\frac{\sigma^2i^2\Delta\tau+(r-q)i\Delta\tau}{2}$

Maka diperoleh

$$\alpha\, V_i^{n+1}=\beta\, V_i^n+\gamma\, V_{i-1}^n+\delta\, V_{i+1}^{n+1}$$

$$\mathbf{V_i^{n+1}=\frac{1}{\alpha}\left(\beta\, V_i^n+\gamma\, V_{i-1}^n+\delta\, V_{i+1}^{n+1}\right)}$$

Lampiran 3

$$-\frac{V_i^{n+1}-V_i^n}{\Delta\tau}=-\frac{1}{\Delta\tau}\left(\left(V_i^n+\ \Delta\tau V_\tau|_i^n+\frac{\Delta\tau^2}{2!}\ V_{\tau\tau}|_i^n+\cdots\right)-V_i^n\right)$$

$$=-\frac{1}{\Delta\tau}\left(\ \Delta\tau V_\tau|_i^n+\frac{\Delta t^2}{2!}\ V_{\tau\tau}|_i^n\right)$$

$$\frac{1}{2}\sigma^2S^2\left(\frac{V_{i+1}^n-V_i^n-V_i^{n+1}+V_{i-1}^{n+1}}{\Delta S^2}\right)$$

$$=\frac{1}{2\Delta S^2}\sigma^2S^2\left(\left(V_i^n+\ \Delta SV_S|_i^n+\frac{\Delta S^2}{2!}\ V_{SS}|_i^n+\cdots\right)-V_i^n\right.$$

$$-\left(V_i^n+\ \Delta\tau V_\tau|_i^n+\frac{\Delta\tau^2}{2!}\ V_{\tau\tau}|_i^n+\cdots\right)$$

$$+\left(V_i^n+\Delta\tau\ V_\tau|_i^n-\Delta S\ V_S|_i^n+\frac{1}{2}(\Delta\tau^2\ V_{\tau\tau}|_i^n+\Delta S^2\ V_{SS}|_i^n-2\Delta\tau\Delta SV_{\tau S})\right.$$

$$\left.+\cdots\right)\Big)=\frac{1}{2\Delta S^2}\sigma^2S^2(\Delta S^2\ V_{SS}|_i^n-\Delta\tau\Delta SV_{\tau S})$$

$$(r-q)S\left(\frac{V_{i+1}^n+V_i^n-V_i^{n+1}-V_{i-1}^{n+1}}{2\Delta S}\right)$$

$$=\frac{(r-q)S}{2\Delta S}\left(\left(V_i^n+\ \Delta SV_S|_i^n+\frac{\Delta S^2}{2!}\ V_{SS}|_i^n+\cdots\right)+V_i^n\right.$$

$$-\left(V_i^n+\ \Delta\tau V_\tau|_i^n+\frac{\Delta\tau^2}{2!}\ V_{\tau\tau}|_i^n+\cdots\right)$$

$$-\left(V_i^n+\Delta\tau\ V_\tau|_i^n-\Delta S\ V_S|_i^n+\frac{1}{2}(\Delta t^2\ V_{\tau\tau}|_i^n+\Delta S^2\ V_{SS}|_i^n-2\Delta\tau\Delta SV_{\tau S})\right.$$

$$\left.+\cdots\right)\Big)$$

$$=\frac{(r-q)S}{2\Delta S}(-2\Delta tV_\tau|_i^n+\ 2\Delta SV_S|_i^n-\Delta\tau^2\ V_{\tau\tau}|_i^n+\Delta S^2\ V_{SS}|_i^n-\Delta\tau\Delta SV_{\tau S})$$

$$rV_i^n=rV_i^n$$

Sehingga didapatkan persamaan berikut

$$-\frac{1}{\Delta\tau}\left(\ \Delta\tau V_\tau|_i^n+\frac{\Delta\tau^2}{2!}\ V_{\tau\tau}|_i^n\right)+\frac{1}{2\Delta S^2}\sigma^2S^2(\Delta S^2\ V_{SS}|_i^n-\Delta\tau\Delta SV_{\tau S})$$

$$+\frac{(r-q)S}{2\Delta S}(-2\Delta\tau V_\tau|_i^n+\ 2\Delta SV_S|_i^n-\Delta\tau^2\ V_{\tau\tau}|_i^n+\Delta S^2\ V_{SS}|_i^n-\Delta\tau\Delta SV_{\tau S})$$

$$-rV_i^n=0$$

Lampiran 4

$$-\frac{V_i^{n+1}-V_i^n}{\Delta\tau}=-\frac{1}{\Delta\tau}\left(\left(V_i^n+\ \Delta\tau V_\tau|_i^n+\frac{\Delta\tau^2}{2!}\ V_{\tau\tau}|_i^n+\cdots\right)-V_i^n\right)$$

$$=-\frac{1}{\Delta\tau}\left(\Delta\tau V_\tau|_i^n+\frac{\Delta\tau^2}{2!}\ V_{\tau\tau}|_i^n\right)$$

$$\frac{1}{2}\sigma^2S^2\left(\frac{V_{i+1}^{n+1}-V_i^{n+1}-V_i^n+V_{i-1}^n}{\Delta S^2}\right)$$

$$=\frac{\sigma^2S^2}{2\Delta S^2}\left(\left(V_i^n+\Delta\tau\ V_\tau|_i^n+\Delta S\ V_S|_i^n+\frac{1}{2}(\Delta\tau^2\ V_{\tau\tau}|_i^n+\Delta S^2\ V_{SS}|_i^n+2\Delta\tau\Delta SV_{\tau S})\right.\right.$$

$$\left.+\cdots\right)-\left(V_i^n+\ \Delta\tau V_\tau|_i^n+\frac{\Delta\tau^2}{2!}\ V_{\tau\tau}|_i^n+\cdots\right)-V_i^n$$

$$\left.+\left(V_i^n-\ \Delta SV_S|_i^n+\frac{\Delta S^2}{2!}\ V_{SS}|_i^n-\cdots\right)\right)=\frac{\sigma^2S^2}{2\Delta S^2}(\Delta S^2\ V_{SS}|_i^n+\Delta\tau\Delta SV_{\tau S})$$

$$(r-q)S\left(\frac{V_{i+1}^{n+1}+V_i^{n+1}-V_i^n-V_{i-1}^n}{2\Delta S}\right)$$

$$=\frac{(r-q)S}{2\Delta S}\left(\left(V_i^n+\Delta\tau\ V_\tau|_i^n+\Delta S\ V_S|_i^n\right.\right.$$

$$\left.+\frac{1}{2}(\Delta\tau^2\ V_{\tau\tau}|_i^n+\Delta S^2\ V_{SS}|_i^n+2\Delta\tau\Delta SV_{\tau S})+\cdots\right)$$

$$+\left(V_i^n+\ \Delta\tau V_\tau|_i^n+\frac{\Delta\tau^2}{2!}\ V_{\tau\tau}|_i^n+\cdots\right)-V_i^n$$

$$\left.-\left(V_i^n-\ \Delta SV_S|_i^n+\frac{\Delta S^2}{2!}\ V_{SS}|_i^n-\cdots\right)\right)$$

$$=\frac{(r-q)S}{2\Delta S}(2\Delta tV_\tau|_i^n+\ 2\Delta SV_S|_i^n+\Delta\tau^2\ V_{\tau\tau}|_i^n+\Delta\tau\Delta SV_{\tau S})$$

$$rV_i^n=rV_i^n$$

Sehingga diperoleh

$$-\frac{1}{\Delta\tau}\left(\Delta\tau V_\tau|_i^n+\frac{\Delta\tau^2}{2!}\ V_{\tau\tau}|_i^n\right)+\frac{\sigma^2S^2}{2\Delta S^2}(\Delta S^2\ V_{SS}|_i^n+\Delta\tau\Delta SV_{\tau S})$$

$$+\frac{(r-q)S}{2\Delta S}(2\Delta tV_\tau|_i^n+\ 2\Delta SV_S|_i^n+\Delta\tau^2\ V_{\tau\tau}|_i^n+\Delta\tau\Delta SV_{\tau S})-rV_i^n=0$$

Lampiran 5

Data Harga Saham The Coca-Cola Company

Tanggal	Harga Penutupan
7/22/2022	61.59
7/25/2022	62.19
7/26/2022	63.21
7/27/2022	63.01
7/28/2022	64.06
7/29/2022	64.17
8/1/2022	64.52
8/2/2022	63.64
8/3/2022	63.92
8/4/2022	63.67
8/5/2022	63.38
8/8/2022	62.97
8/9/2022	63.05
8/10/2022	63.65
8/11/2022	63.22
8/12/2022	63.7
8/15/2022	64.5
8/16/2022	65.03
8/17/2022	64.88
8/18/2022	65.22
8/19/2022	65.17
8/22/2022	64.2
8/23/2022	64.27
8/24/2022	64.36
8/25/2022	64.67
8/26/2022	63.11
8/29/2022	62.73
8/30/2022	62.15
8/31/2022	61.71
9/1/2022	62
9/2/2022	61.15
9/6/2022	61.18
9/7/2022	62.31
9/8/2022	62.12
9/9/2022	62.32
9/12/2022	62.5
9/13/2022	60.47
9/14/2022	60.79
9/15/2022	59.53
9/16/2022	59.54
9/19/2022	59.99
9/20/2022	59.9
9/21/2022	59.4
9/22/2022	59.26
9/23/2022	58.6
9/26/2022	57.87
9/27/2022	56.38
9/28/2022	56.98
9/29/2022	56.57
9/30/2022	56.02
10/3/2022	56.65
10/4/2022	56.78
10/5/2022	56.24
10/6/2022	55.03
10/7/2022	54.51
10/10/2022	54.39
10/11/2022	54.48
10/12/2022	55.14
10/13/2022	55.87
10/14/2022	54.98
10/17/2022	55.69
10/18/2022	56.44
10/19/2022	55.96
10/20/2022	55.08
10/21/2022	55.96
10/24/2022	57.57
10/25/2022	58.95
10/26/2022	59.39

10/27/2022	59.53
10/28/2022	60.76
10/31/2022	59.85
11/1/2022	59.64
11/2/2022	58.81
11/3/2022	58.78
11/4/2022	59.26
11/7/2022	59.49
11/8/2022	59.6
11/9/2022	58.77
11/10/2022	60.88
11/11/2022	61.32
11/14/2022	60.73
11/15/2022	60.63
11/16/2022	60.52
11/17/2022	60.71
11/18/2022	61.14
11/21/2022	62.08
11/22/2022	62.35
11/23/2022	62.63
11/25/2022	62.69
11/28/2022	62.7
11/29/2022	62.48
11/30/2022	63.61
12/1/2022	63.79
12/2/2022	64.35

12/5/2022	63.47
12/6/2022	63.44
12/7/2022	63.54
12/8/2022	63.81
12/9/2022	63.14
12/12/2022	63.97
12/13/2022	63.99
12/14/2022	63.99
12/15/2022	63.11
12/16/2022	62.75
12/19/2022	62.84
12/20/2022	62.79
12/21/2022	63.8
12/22/2022	63.34
12/23/2022	63.82
12/27/2022	64.21
12/28/2022	63.57
12/29/2022	63.95
12/30/2022	63.61
1/3/2023	62.95
1/4/2023	62.92
1/5/2023	62.2
1/6/2023	63.4
1/9/2023	62.61
1/10/2023	62.13
1/11/2023	62.01

1/12/2023	61.21
1/13/2023	61.43
1/17/2023	61.68
1/18/2023	59.81
1/19/2023	59.72
1/20/2023	60.08
1/23/2023	60.23
1/24/2023	60.55
1/25/2023	60.93
1/26/2023	60.81
1/27/2023	60.49
1/30/2023	60.64
1/31/2023	61.32
2/1/2023	61.33
2/2/2023	60.28
2/3/2023	59.83
2/6/2023	60.17
2/7/2023	60.07
2/8/2023	59.72
2/9/2023	59.62
2/10/2023	59.62
2/13/2023	60.6
2/14/2023	59.59
2/15/2023	59.59
2/16/2023	59.22
2/17/2023	60.12

2/21/2023	59.8
2/22/2023	59.98
2/23/2023	60.09
2/24/2023	59.84
2/27/2023	59.82
2/28/2023	59.51
3/1/2023	58.86
3/2/2023	59.72
3/3/2023	59.44
3/6/2023	60.36
3/7/2023	60.01
3/8/2023	60.04
3/9/2023	59.46
3/10/2023	59.21
3/13/2023	59.81
3/14/2023	60.03
3/15/2023	60.43
3/16/2023	60.3
3/17/2023	60.02
3/20/2023	60.6
3/21/2023	60.32
3/22/2023	60.05
3/23/2023	59.92
3/24/2023	60.9
3/27/2023	61.35
3/28/2023	61.42

3/29/2023	61.86
3/30/2023	61.85
3/31/2023	62.03
4/3/2023	62.4
4/4/2023	62.21
4/5/2023	62.8
4/6/2023	62.84
4/10/2023	62.69
4/11/2023	62.58
4/12/2023	62.69
4/13/2023	63.15
4/14/2023	63.05
4/17/2023	63.46
4/18/2023	63.56
4/19/2023	63.68
4/20/2023	63.96
4/21/2023	64.05
4/24/2023	63.95
4/25/2023	63.85
4/26/2023	63.55
4/27/2023	63.68
4/28/2023	64.15
5/1/2023	64.3
5/2/2023	64.01
5/3/2023	63.65
5/4/2023	63.72

5/5/2023	64.02
5/8/2023	63.92
5/9/2023	63.39
5/10/2023	63.5
5/11/2023	63.86
5/12/2023	64.11
5/15/2023	63.94
5/16/2023	63.22
5/17/2023	63.15
5/18/2023	62.8
5/19/2023	62.83
5/22/2023	61.51
5/23/2023	61.4
5/24/2023	60.88
5/25/2023	60.41
5/26/2023	60.26
5/30/2023	59.78
5/31/2023	59.66
6/1/2023	60
6/2/2023	61.16
6/5/2023	60.75
6/6/2023	60.31
6/7/2023	60.22
6/8/2023	60.37
6/9/2023	60.47
6/12/2023	60.21

6/13/2023	60.45
6/14/2023	60.86
6/15/2023	61.23
6/16/2023	61.67
6/20/2023	61.26
6/21/2023	61.43
6/22/2023	61.85
6/23/2023	61.2
6/26/2023	61.22
6/27/2023	61.09
6/28/2023	60.52
6/29/2023	60.02
6/30/2023	60.22
7/3/2023	60.58
7/5/2023	61.03
7/6/2023	60.56
7/7/2023	59.76
7/10/2023	59.31
7/11/2023	59.52
7/12/2023	59.84
7/13/2023	60.35
7/14/2023	60.9
7/17/2023	60.81
7/18/2023	60.57
7/19/2023	61.64
7/20/2023	62.39
7/21/2023	62.44

Sumber: https://finance.yahoo.com/

Perhitungan Return, Standar Deviasi dan Volatilitas Saham

The Coca-Cola Company

No	Tanggal	Harga penutupan	*Return* (R_t)	$R_t - \bar{R}$	$(R_t - \bar{R})^2 2$
1	7/22/2022	61.59			
2	7/25/2022	62.19	0.0167	0.0092	0.0001
3	7/26/2022	63.21	0.0232	0.0157	0.0002
4	7/27/2022	63.01	0.0038	-0.0037	0.0000
5	7/28/2022	64.06	0.0234	0.0159	0.0003
6	7/29/2022	64.17	0.0085	0.0011	0.0000
7	8/1/2022	64.52	0.0122	0.0047	0.0000
8	8/2/2022	63.64	-0.0068	-0.0143	0.0002
9	8/3/2022	63.92	0.0113	0.0038	0.0000
10	8/4/2022	63.67	0.0030	-0.0045	0.0000
11	8/5/2022	63.38	0.0024	-0.0051	0.0000
12	8/8/2022	62.97	0.0005	-0.0070	0.0000
13	8/9/2022	63.05	0.0082	0.0007	0.0000
14	8/10/2022	63.65	0.0164	0.0089	0.0001
15	8/11/2022	63.22	0.0002	-0.0073	0.0001
16	8/12/2022	63.7	0.0144	0.0070	0.0000
17	8/15/2022	64.5	0.0193	0.0118	0.0001
18	8/16/2022	65.03	0.0149	0.0074	0.0001
19	8/17/2022	64.88	0.0044	-0.0030	0.0000
20	8/18/2022	65.22	0.0120	0.0045	0.0000
21	8/19/2022	65.17	0.0060	-0.0015	0.0000

22	8/22/2022	64.2	-0.0082	-0.0157	0.0002
23	8/23/2022	64.27	0.0079	0.0004	0.0000
24	8/24/2022	64.36	0.0082	0.0007	0.0000
25	8/25/2022	64.67	0.0116	0.0041	0.0000
26	8/26/2022	63.11	-0.0175	-0.0250	0.0006
27	8/29/2022	62.73	0.0010	-0.0065	0.0000
28	8/30/2022	62.15	-0.0022	-0.0097	0.0001
29	8/31/2022	61.71	0.0000	-0.0075	0.0001
30	9/1/2022	62	0.0118	0.0043	0.0000
31	9/2/2022	61.15	-0.0066	-0.0141	0.0002
32	9/6/2022	61.18	0.0077	0.0002	0.0000
33	9/7/2022	62.31	0.0253	0.0178	0.0003
34	9/8/2022	62.12	0.0040	-0.0035	0.0000
35	9/9/2022	62.32	0.0102	0.0028	0.0000
36	9/12/2022	62.5	0.0099	0.0024	0.0000
37	9/13/2022	60.47	-0.0258	-0.0333	0.0011
38	9/14/2022	60.79	0.0125	0.0050	0.0000
39	9/15/2022	59.53	-0.0136	-0.0211	0.0004
40	9/16/2022	59.54	0.0075	0.0000	0.0000
41	9/19/2022	59.99	0.0148	0.0073	0.0001
42	9/20/2022	59.9	0.0058	-0.0017	0.0000
43	9/21/2022	59.4	-0.0010	-0.0085	0.0001
44	9/22/2022	59.26	0.0050	-0.0025	0.0000
45	9/23/2022	58.6	-0.0037	-0.0112	0.0001
46	9/26/2022	57.87	-0.0050	-0.0125	0.0002

47	9/27/2022	56.38	-0.0183	-0.0258	0.0007
48	9/28/2022	56.98	0.0183	0.0108	0.0001
49	9/29/2022	56.57	0.0005	-0.0070	0.0000
50	9/30/2022	56.02	-0.0019	-0.0094	0.0001
51	10/3/2022	56.65	0.0189	0.0114	0.0001
52	10/4/2022	56.78	0.0100	0.0025	0.0000
53	10/5/2022	56.24	-0.0018	-0.0093	0.0001
54	10/6/2022	55.03	-0.0138	-0.0213	0.0005
55	10/7/2022	54.51	-0.0015	-0.0090	0.0001
56	10/10/2022	54.39	0.0059	-0.0016	0.0000
57	10/11/2022	54.48	0.0097	0.0022	0.0000
58	10/12/2022	55.14	0.0200	0.0125	0.0002
59	10/13/2022	55.87	0.0210	0.0135	0.0002
60	10/14/2022	54.98	-0.0081	-0.0156	0.0002
61	10/17/2022	55.69	0.0207	0.0132	0.0002
62	10/18/2022	56.44	0.0211	0.0136	0.0002
63	10/19/2022	55.96	-0.0007	-0.0082	0.0001
64	10/20/2022	55.08	-0.0079	-0.0154	0.0002
65	10/21/2022	55.96	0.0237	0.0162	0.0003
66	10/24/2022	57.57	0.0360	0.0285	0.0008
67	10/25/2022	58.95	0.0311	0.0236	0.0006
68	10/26/2022	59.39	0.0148	0.0073	0.0001
69	10/27/2022	59.53	0.0097	0.0022	0.0000
70	10/28/2022	60.76	0.0277	0.0202	0.0004
71	10/31/2022	59.85	-0.0078	-0.0153	0.0002

72	11/1/2022	59.64	0.0038	-0.0037	0.0000
73	11/2/2022	58.81	-0.0066	-0.0141	0.0002
74	11/3/2022	58.78	0.0069	-0.0005	0.0000
75	11/4/2022	59.26	0.0155	0.0080	0.0001
76	11/7/2022	59.49	0.0112	0.0037	0.0000
77	11/8/2022	59.6	0.0092	0.0017	0.0000
78	11/9/2022	58.77	-0.0066	-0.0141	0.0002
79	11/10/2022	60.88	0.0425	0.0350	0.0012
80	11/11/2022	61.32	0.0144	0.0069	0.0000
81	11/14/2022	60.73	-0.0024	-0.0099	0.0001
82	11/15/2022	60.63	0.0056	-0.0019	0.0000
83	11/16/2022	60.52	0.0054	-0.0021	0.0000
84	11/17/2022	60.71	0.0104	0.0029	0.0000
85	11/18/2022	61.14	0.0142	0.0067	0.0000
86	11/21/2022	62.08	0.0223	0.0148	0.0002
87	11/22/2022	62.35	0.0114	0.0039	0.0000
88	11/23/2022	62.63	0.0115	0.0040	0.0000
89	11/25/2022	62.69	0.0080	0.0005	0.0000
90	11/28/2022	62.7	0.0072	-0.0003	0.0000
91	11/29/2022	62.48	0.0035	-0.0040	0.0000
92	11/30/2022	63.61	0.0248	0.0173	0.0003
93	12/1/2022	63.79	0.0100	0.0025	0.0000
94	12/2/2022	64.35	0.0159	0.0084	0.0001
95	12/5/2022	63.47	-0.0065	-0.0140	0.0002
96	12/6/2022	63.44	0.0068	-0.0007	0.0000

97	12/7/2022	63.54	0.0088	0.0013	0.0000
98	12/8/2022	63.81	0.0114	0.0039	0.0000
99	12/9/2022	63.14	-0.0033	-0.0108	0.0001
100	12/12/2022	63.97	0.0202	0.0127	0.0002
101	12/13/2022	63.99	0.0075	0.0000	0.0000
102	12/14/2022	63.99	0.0072	-0.0003	0.0000
103	12/15/2022	63.11	-0.0066	-0.0141	0.0002
104	12/16/2022	62.75	0.0016	-0.0059	0.0000
105	12/19/2022	62.84	0.0087	0.0012	0.0000
106	12/20/2022	62.79	0.0065	-0.0010	0.0000
107	12/21/2022	63.8	0.0231	0.0156	0.0002
108	12/22/2022	63.34	0.0000	-0.0075	0.0001
109	12/23/2022	63.82	0.0147	0.0072	0.0001
110	12/27/2022	64.21	0.0132	0.0057	0.0000
111	12/28/2022	63.57	-0.0028	-0.0103	0.0001
112	12/29/2022	63.95	0.0131	0.0056	0.0000
113	12/30/2022	63.61	0.0019	-0.0056	0.0000
114	1/3/2023	62.95	-0.0031	-0.0106	0.0001
115	1/4/2023	62.92	0.0068	-0.0007	0.0000
116	1/5/2023	62.2	-0.0041	-0.0116	0.0001
117	1/6/2023	63.4	0.0263	0.0188	0.0004
118	1/9/2023	62.61	-0.0052	-0.0127	0.0002
119	1/10/2023	62.13	-0.0003	-0.0078	0.0001
120	1/11/2023	62.01	0.0055	-0.0020	0.0000
121	1/12/2023	61.21	-0.0055	-0.0130	0.0002

122	1/13/2023	61.43	0.0110	0.0036	0.0000
123	1/17/2023	61.68	0.0115	0.0040	0.0000
124	1/18/2023	59.81	-0.0231	-0.0306	0.0009
125	1/19/2023	59.72	0.0062	-0.0013	0.0000
126	1/20/2023	60.08	0.0136	0.0061	0.0000
127	1/23/2023	60.23	0.0101	0.0026	0.0000
128	1/24/2023	60.55	0.0129	0.0054	0.0000
129	1/25/2023	60.93	0.0138	0.0063	0.0000
130	1/26/2023	60.81	0.0056	-0.0019	0.0000
131	1/27/2023	60.49	0.0023	-0.0052	0.0000
132	1/30/2023	60.64	0.0100	0.0025	0.0000
133	1/31/2023	61.32	0.0186	0.0111	0.0001
134	2/1/2023	61.33	0.0076	0.0001	0.0000
135	2/2/2023	60.28	-0.0097	-0.0172	0.0003
136	2/3/2023	59.83	0.0002	-0.0073	0.0001
137	2/6/2023	60.17	0.0133	0.0058	0.0000
138	2/7/2023	60.07	0.0060	-0.0015	0.0000
139	2/8/2023	59.72	0.0018	-0.0057	0.0000
140	2/9/2023	59.62	0.0060	-0.0015	0.0000
141	2/10/2023	59.62	0.0077	0.0002	0.0000
142	2/13/2023	60.6	0.0239	0.0164	0.0003
143	2/14/2023	59.59	-0.0091	-0.0166	0.0003
144	2/15/2023	59.59	0.0077	0.0002	0.0000
145	2/16/2023	59.22	0.0015	-0.0060	0.0000
146	2/17/2023	60.12	0.0227	0.0152	0.0002

147	2/21/2023	59.8	0.0023	-0.0052	0.0000
148	2/22/2023	59.98	0.0106	0.0031	0.0000
149	2/23/2023	60.09	0.0095	0.0020	0.0000
150	2/24/2023	59.84	0.0035	-0.0040	0.0000
151	2/27/2023	59.82	0.0073	-0.0002	0.0000
152	2/28/2023	59.51	0.0025	-0.0050	0.0000
153	3/1/2023	58.86	-0.0032	-0.0107	0.0001
154	3/2/2023	59.72	0.0222	0.0147	0.0002
155	3/3/2023	59.44	0.0030	-0.0045	0.0000
156	3/6/2023	60.36	0.0230	0.0155	0.0002
157	3/7/2023	60.01	0.0018	-0.0057	0.0000
158	3/8/2023	60.04	0.0081	0.0006	0.0000
159	3/9/2023	59.46	-0.0020	-0.0095	0.0001
160	3/10/2023	59.21	0.0035	-0.0040	0.0000
161	3/13/2023	59.81	0.0177	0.0102	0.0001
162	3/14/2023	60.03	0.0113	0.0038	0.0000
163	3/15/2023	60.43	0.0142	0.0067	0.0000
164	3/16/2023	60.3	0.0054	-0.0021	0.0000
165	3/17/2023	60.02	0.0030	-0.0045	0.0000
166	3/20/2023	60.6	0.0172	0.0097	0.0001
167	3/21/2023	60.32	0.0030	-0.0045	0.0000
168	3/22/2023	60.05	0.0031	-0.0044	0.0000
169	3/23/2023	59.92	0.0055	-0.0020	0.0000
170	3/24/2023	60.9	0.0237	0.0163	0.0003
171	3/27/2023	61.35	0.0148	0.0073	0.0001

172	3/28/2023	61.42	0.0086	0.0011	0.0000
173	3/29/2023	61.86	0.0145	0.0070	0.0000
174	3/30/2023	61.85	0.0072	-0.0002	0.0000
175	3/31/2023	62.03	0.0103	0.0028	0.0000
176	4/3/2023	62.4	0.0133	0.0058	0.0000
177	4/4/2023	62.21	0.0043	-0.0032	0.0000
178	4/5/2023	62.8	0.0167	0.0092	0.0001
179	4/6/2023	62.84	0.0079	0.0004	0.0000
180	4/10/2023	62.69	0.0049	-0.0026	0.0000
181	4/11/2023	62.58	0.0056	-0.0019	0.0000
182	4/12/2023	62.69	0.0091	0.0016	0.0000
183	4/13/2023	63.15	0.0146	0.0071	0.0001
184	4/14/2023	63.05	0.0057	-0.0018	0.0000
185	4/17/2023	63.46	0.0137	0.0062	0.0000
186	4/18/2023	63.56	0.0088	0.0013	0.0000
187	4/19/2023	63.68	0.0091	0.0016	0.0000
188	4/20/2023	63.96	0.0116	0.0041	0.0000
189	4/21/2023	64.05	0.0086	0.0011	0.0000
190	4/24/2023	63.95	0.0056	-0.0019	0.0000
191	4/25/2023	63.85	0.0056	-0.0019	0.0000
192	4/26/2023	63.55	0.0025	-0.0050	0.0000
193	4/27/2023	63.68	0.0092	0.0017	0.0000
194	4/28/2023	64.15	0.0145	0.0070	0.0000
195	5/1/2023	64.3	0.0095	0.0020	0.0000
196	5/2/2023	64.01	0.0026	-0.0049	0.0000

197	5/3/2023	63.65	0.0016	-0.0059	0.0000
198	5/4/2023	63.72	0.0083	0.0008	0.0000
199	5/5/2023	64.02	0.0119	0.0044	0.0000
200	5/8/2023	63.92	0.0056	-0.0019	0.0000
201	5/9/2023	63.39	-0.0011	-0.0086	0.0001
202	5/10/2023	63.5	0.0090	0.0015	0.0000
203	5/11/2023	63.86	0.0128	0.0053	0.0000
204	5/12/2023	64.11	0.0111	0.0036	0.0000
205	5/15/2023	63.94	0.0045	-0.0030	0.0000
206	5/16/2023	63.22	-0.0041	-0.0116	0.0001
207	5/17/2023	63.15	0.0061	-0.0013	0.0000
208	5/18/2023	62.8	0.0017	-0.0058	0.0000
209	5/19/2023	62.83	0.0078	0.0003	0.0000
210	5/22/2023	61.51	-0.0138	-0.0213	0.0005
211	5/23/2023	61.4	0.0057	-0.0018	0.0000
212	5/24/2023	60.88	-0.0010	-0.0085	0.0001
213	5/25/2023	60.41	-0.0002	-0.0077	0.0001
214	5/26/2023	60.26	0.0051	-0.0024	0.0000
215	5/30/2023	59.78	-0.0003	-0.0078	0.0001
216	5/31/2023	59.66	0.0057	-0.0018	0.0000
217	6/1/2023	60	0.0133	0.0058	0.0000
218	6/2/2023	61.16	0.0266	0.0191	0.0004
219	6/5/2023	60.75	0.0008	-0.0067	0.0000
220	6/6/2023	60.31	0.0003	-0.0072	0.0001
221	6/7/2023	60.22	0.0061	-0.0014	0.0000

222	6/8/2023	60.37	0.0101	0.0026	0.0000
223	6/9/2023	60.47	0.0092	0.0017	0.0000
224	6/12/2023	60.21	0.0033	-0.0042	0.0000
225	6/13/2023	60.45	0.0116	0.0041	0.0000
226	6/14/2023	60.86	0.0143	0.0068	0.0000
227	6/15/2023	61.23	0.0135	0.0060	0.0000
228	6/16/2023	61.67	0.0146	0.0071	0.0001
229	6/20/2023	61.26	0.0008	-0.0067	0.0000
230	6/21/2023	61.43	0.0102	0.0027	0.0000
231	6/22/2023	61.85	0.0142	0.0067	0.0000
232	6/23/2023	61.2	-0.0031	-0.0106	0.0001
233	6/26/2023	61.22	0.0078	0.0003	0.0000
234	6/27/2023	61.09	0.0054	-0.0021	0.0000
235	6/28/2023	60.52	-0.0018	-0.0093	0.0001
236	6/29/2023	60.02	-0.0007	-0.0082	0.0001
237	6/30/2023	60.22	0.0109	0.0034	0.0000
238	7/3/2023	60.58	0.0135	0.0060	0.0000
239	7/5/2023	61.03	0.0149	0.0074	0.0001
240	7/6/2023	60.56	-0.0002	-0.0077	0.0001
241	7/7/2023	59.76	-0.0056	-0.0131	0.0002
242	7/10/2023	59.31	0.0002	-0.0073	0.0001
243	7/11/2023	59.52	0.0112	0.0037	0.0000
244	7/12/2023	59.84	0.0130	0.0055	0.0000
245	7/13/2023	60.35	0.0161	0.0086	0.0001
246	7/14/2023	60.9	0.0166	0.0091	0.0001

247	7/17/2023	60.81	0.0061	-0.0014	0.0000
248	7/18/2023	60.57	0.0036	-0.0039	0.0000
249	7/19/2023	61.64	0.0249	0.0174	0.0003
250	7/20/2023	62.39	0.0194	0.0119	0.0001
251	7/21/2023	62.44	0.0081	0.0006	0.0000
Jumlah			1.858132719		0.00225433
Rata-rata *return* $(\bar{R})$			0.007402919		
Standar deviasi (S_{R_t})			0.00949595		
Volatilitas (σ)			0.150444145		

Data Dividen yang Dibagikan saham The Coca-Cola Company

Tanggal	Dividends
9/15/2022	0.44
11/30/2022	0.44
3/16/2023	0.46
6/15/2023	0.46

Sumber: https://finance.yahoo.com/

Suku Bunga Bebas Rsiko Sertifikat Bank Indonesia (SBI) Tiga bulan terakhir disesuaikan dari data saham The Coca-Cola Company

Tanggal	Suku Bunga
06/22/2023	5.75%
05/25/2023	5.75%
04/18/2023	5.75%

Sumber: https://pusatdata.kontan.co.id/

Lampiran 6

```
clc;
clear all;
s_awal=62.44;              %Harga Saham awal
D=0.46;                    %Dividen
sa=2*s_awal;               %Batas Saham Max
K=48;                      %Harga Laksana
sigma=0.15;                %Volatilitas
r=0.0575;                  %Suku bunga
T=3/12;                    %Waktu (Umur) Opsi dalam tahun
M=3000;N=30000;            %Jumlah Grid
ds=sa/M;
dt=T/N;

%Nilai s(i)
for i=1:M+1
    s(i)=(i-1)*ds;
end

for opsi=1:2
    if opsi==1
     %syarat batas Opsi Beli
     for n=1:1:N+1
          v(1,n)=0; %kiri
          v(M+1,n)=sa*exp(-D*(n-1)*dt)-K*exp(-r*(n-
     1)*dt);  %kanan
     end
     %syarat awal Opsi Beli
     for i=2:1:M
          v(i,1)=max((s(i)-K),0);
     end
    else
        %Syarat Batas Opsi jual
        for n=1:1:N+1
            v(1,n)=K*exp(-r*(n-1)*dt);%kiri
            v((M+1),n)=0;%kanan
        end
        %Syarat Awal Opsi Jual
        for i=2:1:M
            v(i,1)=max((K-s(i)),0);
        end

    end
    for n=1:1:N
    if mod(n,2)==1
        for i=2:1:M
```

```
            a1(i)=1/(1+(sigma^2*(i-1)^2*dt+(r-D)*(i-
1)*dt)/2)*(1-((sigma^2*(i-1)^2*dt-(r-D)*(i-1)*dt)/2)-
r*dt);
            b1(i)=1/(1+(sigma^2*(i-1)^2*dt+(r-D)*(i-
1)*dt)/2)*((sigma^2*(i-1)^2*dt+(r-D)*(i-1)*dt)/2);
            c1(i)=1/(1+(sigma^2*(i-1)^2*dt+(r-D)*(i-
1)*dt)/2)*((sigma^2*(i-1)^2*dt-(r-D)*(i-1)*dt)/2);


v(i,(n+1))=a1(i)*v(i,n)+b1(i)*v(i+1,n)+c1(i)*v(i-
1,n+1); %left to Right
      end
    else
        for i=M:-1:2
           a2(i)=1/(1+(sigma^2*(i-1)^2*dt-(r-D)*(i-
1)*dt)/2)*(1-((sigma^2*(i-1)^2*dt+(r-D)*(i-1)*dt)/2)-
r*dt);
            b2(i)=1/(1+(sigma^2*(i-1)^2*dt-(r-D)*(i-
1)*dt)/2)*((sigma^2*(i-1)^2*dt-(r-D)*(i-1)*dt)/2);
            c2(i)=1/(1+(sigma^2*(i-1)^2*dt-(r-D)*(i-
1)*dt)/2)*((sigma^2*(i-1)^2*dt+(r-D)*(i-1)*dt)/2);

            v(i,(n+1))=a2(i)*v(i,n)+b2(i)*v(i-
1,n)+c2(i)*v(i+1,n+1); %Right to Left
        end
    end
    end
option(opsi)=interp1(s,v(:,N+1),s_awal);
end
Opsi_beli=option(1)
Opsi_jual=option(2)

%Solusi Analitik
d1=((log(s_awal/K))+((r-
D+(sigma^2)/2)*T))/(sigma*sqrt(T));
d2=d1-sigma*sqrt(T);
No=@(x) exp((-(x.^2))/2);
Nd1=(1/sqrt(2*pi))*integral(No,-Inf,d1);
Nd2=(1/sqrt(2*pi))*integral(No,-Inf,d2);
CC=s_awal*exp(-D*T)*Nd1-K*exp(-r*T)*Nd2
PP=CC-s_awal*exp(-D*T)+K*exp(-r*T)

%Galat
Galat_OC=Opsi_beli-CC
Galat_OP=Opsi_jual-PP
```