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LAMPIRAN

Lampiran 1 Data Produk Domestik Regional Bruto Tahun 2020

Provinsi	y	x1	x2	x3	x4	x5	x6	x7
Aceh	131585	1781,72	2937,99	429	101597	4647806	3397	103740
Sumatra Utara	533746	3048,5	11192,9	830	244831	13045164	38949	120474
Sumatra Barat	169458	1525,2	3429,29	355	96669	6930832	9008	94514
Riau	490024	2799,81	4967,05	304	92611	5203647	34692	51151
Jambi	148450	1032,84	2010,6	249	35803	2300410	18434	26297
Sumatera Selatan	315143	1513,65	5312,77	430	87977	5466863	35431	75690
Bengkulu	46338	1562,67	1013,5	204	37041	1427427	7364	20435
Lampung	240307	1693,27	4959,02	392	122293	7749577	9363	88659
Kep. Bangka Belitung	52702	850,99	1217,52	89	9799	847930	5420	21576
Kep. Riau	174977	896,45	887,6	124	26259	421559	14635	14225
DKI Jakarta	1792795	6432473	32166,7	508	102706	43920059	442	61430
Jawa Barat	1455235	2360,58	49542,3	1460	480353	90182229	243767	632136
Jawa Tengah	965629	2404,74	25090,7	1179	365019	11812255	36682	918079
DI Yogyakarta	101680	760,45	3012,45	206	46881	22319030	1712	138117
Jawa Timur	1610420	1421	37613,6	1363	413877	12534370	46124	833453
Banten	441296	762,03	22268,7	365	126865	30090681	65377	109941
Bali	147550	743,34	4946,86	192	61518	7818391	2299	150348
NTB	93269	1484,43	2149,42	213	84611	3470669	6280	104725
NTT	68807	2650	1133,48	464	123149	1889690	3820	136221
Kalimantan Barat	134743	1534,75	2715,67	301	74917	1678423	28118	39382
KAlimantan Tengah	98957	1272,08	1493,69	233	50920	1410749	12932	23284
Kalimantan Selatan	130866	762,61	2939	283	25394	4350200	41395	55873
Kalimantan Timur	472865	884,8	4123,86	244	55340	2236182	4622	24794
[illegible]	[illegible]	851,88	261,82	66	13923	202610	472	4978
[illegible]	[illegible]	926,74	1862,28	246	39528	2370027	11581	37198
[illegible]	[illegible]	1643,74	1271,06	247	57959	1334611	5447	84620
[illegible]	[illegible]	2015,23	5977,48	577	153857	8828147	26768	126832

Sulawesi Tenggara	93447	1009,28	1063,52	329	55716	1873628	9435	45604
Gorontalo	28422	467,17	601,58	109	19088	920208	3131	28719
Sulawesi Barat	32082	185,96	423,96	109	26401	690045	3976	25892
Maluku	30765	1080,3	548,12	248	37366	225290	126	22225
Mauku Utara	27868	1276,8	591,34	168	15533	438188	407	13583
Papua Barat	61592	2309,65	547,46	181	16559	282041	7080	4565
Papua	137678	2361,76	1132,4	475	27745	550392	6710	12138

Lampiran 2 Pendeteksian *Outlier* Dengan Menggunakan *DFFITS*

```
> # Mendeteksi outlier
> model <- lm(y ~ x1 + x2 + x3 + x4 + x5 + x6 + x7, data = Data)
> hii <-hatvalues(model)
> t_i <- rstudent(model)
> DFFITS <-t_i*(sqrt(hii/(1-hii)))
> DFFITS
          1           2           3           4           5           6           7 
-0.24944427 -0.74016955 -0.08905308  1.14448614  0.07278544  0.25920009 -0.13601416 
          8           9          10          11          12          13          14 
-0.14284956  0.01010978  0.35091729 -572.03391333 -0.83988172 -2.14835838 -0.56805636 
         15          16          17          18          19          20          21 
 3.66591851 -3.67689262  0.41508034 -0.07359474 -0.48580224 -0.06350510 -0.06744982 
         22          23          24          25          26          27          28 
 0.20459640  1.01906710  0.03509447 -0.06054473  0.18568143  0.01335441 -0.09397337 
         29          30          31          32          33          34 
-0.05451817 -0.06455898 -0.16236761 -0.10925782 -0.04371194 -0.36469247 
> p<-7
> n<-nrow(Data)
> cutoff<- 2*sqrt(p/n)
> cutoff
[1] 0.9074852
> outlier<-abs(DFFITS)>cutoff
> Data[outlier, ]
# A tibble: 6 x 9
  Provinsi               y      x1    x2    x3     x4        x5    x6     x7
  <chr>              <dbl>   <dbl> <dbl> <dbl>  <dbl>     <dbl> <dbl>  <dbl>
1 Riau              490024   2800.  4967.   304  92611   5203647 34692  51151
2 DKI Jakarta      1792795 6432473 32167.   508 102706  43920059   442  61430
3 Jawa Tengah       965629   2405. 25091.  1179 365019 118122553 36682 918079
4 Jawa Timur       1610420   1421  37614.  1363 413877 125343705 46124 833453
5 Banten            441296    762. 22269.   365 126865  30090681 65377 109941
6 Kalimantan Timur  472865    885.  4124.   244  55340   2236182  4622  24794
```

Lampiran 3 Standarisasi Data

```
> Dat_trans
```

	Y	X1	X2	X3	X4	X5	X6	X7
1	-0.071442388	-0.02980183	-0.06093679	0.021368142	0.005596947	-0.05769886	-0.07597167	-0.016935645
2	0.082007566	-0.02960188	0.05991941	0.227402968	0.225068943	-0.01201035	0.06981721	-0.003621936
3	-0.056991434	-0.02984231	-0.05374385	-0.016653248	-0.001954039	-0.04527733	-0.05296252	-0.024275927
4	0.065324848	-0.02964114	-0.03123011	-0.042857178	-0.008171958	-0.05467463	0.05236043	-0.058775888
5	-0.065007319	-0.02992002	-0.07451434	-0.071116319	-0.095216690	-0.07047062	-0.01430911	-0.078549936
6	-0.001403357	-0.02984414	-0.02616856	0.021881944	-0.015272460	-0.05324252	0.05539087	-0.039252457
7	-0.103969530	-0.02983640	-0.08911250	-0.094237434	-0.093319750	-0.07522036	-0.05970410	-0.083213791
8	-0.029958042	-0.02981579	-0.03134767	0.002357447	0.037308639	-0.04082269	-0.05150676	-0.028934213
9	-0.101541260	-0.02994873	-0.08612552	-0.153324728	-0.135061628	-0.07837330	-0.06767591	-0.082306002
10	-0.054885585	-0.02994155	-0.09095575	-0.135341639	-0.109840598	-0.08069311	-0.02988775	-0.088154519
11	0.562414695	0.98518417	0.36698969	0.061958544	0.007296225	0.15597439	-0.08808930	-0.050597831
12	0.433614124	-0.02971046	0.62137807	0.551098579	0.585950323	0.40767851	0.90971893	0.403460578
13	0.246798350	-0.02970349	0.26339302	0.406720061	0.409228433	0.55969678	0.06052087	0.630959192
14	-0.082853044	-0.02996302	-0.05984665	-0.093209829	-0.078242293	0.03844708	-0.08288139	0.010414980
15	0.492827054	-0.02985876	0.44673461	0.501259731	0.484091683	0.59898576	0.09923989	0.563630047
16	0.046732022	-0.02996277	0.22207677	-0.011515222	0.044314140	0.08073123	0.17819109	-0.012002078
17	-0.065350727	-0.02996572	-0.03152570	-0.100403065	-0.055814576	-0.04044828	-0.08047426	0.020146065
18	-0.086062374	-0.02984875	-0.07248193	-0.089613211	-0.020430053	-0.06410345	-0.06414929	-0.016151971
19	-0.095396180	-0.02966478	-0.08735592	0.039351231	0.038620255	-0.07270527	-0.07423706	0.008906507
20	-0.070237410	-0.02984081	-0.06419169	-0.044398586	-0.035283800	-0.07385474	0.02540229	-0.068139402
21	-0.083892041	-0.02988226	-0.08208222	-0.079337160	-0.072053488	-0.07531111	-0.03687128	-0.080947103
22	-0.071716732	-0.02996268	-0.06092200	-0.053647032	-0.111166004	-0.05931808	0.07984757	-0.055019026
23	0.058777600	-0.02994339	-0.04357492	-0.073685332	-0.065280890	-0.07082007	-0.07094828	-0.079745735
24	-0.098473108	-0.02994859	-0.10011755	-0.165142187	-0.128742580	-0.08188437	-0.08796628	-0.095511508
25	-0.088024755	-0.02993677	-0.07668584	-0.072657727	-0.089509015	-0.07009185	-0.04241136	-0.069877010
26	-0.070462533	-0.02982360	-0.08534166	-0.072143924	-0.061267896	-0.07572536	-0.06756519	-0.032147675
27	0.003576047	-0.02976497	-0.01643679	0.097410920	0.085672952	-0.03495438	0.01986631	0.001436541
28	-0.085994456	-0.02992374	-0.08838017	-0.030012114	-0.064704760	-0.07279266	-0.05121151	-0.063189127
29	-0.110805622	-0.03000931	-0.09514326	-0.143048677	-0.120828447	-0.07798005	-0.07706246	-0.076622973
30	-0.109409099	-0.03005369	-0.09774372	-0.143048677	-0.109623016	-0.07923233	-0.07359735	-0.078872157
31	-0.109911619	-0.02991253	-0.09592594	-0.071630121	-0.092821765	-0.08176097	-0.08938513	-0.081789653
32	-0.111017008	-0.02988152	-0.09529318	-0.112734326	-0.126275638	-0.08060263	-0.08823283	-0.088665299
33	-0.098149161	-0.02971850	-0.09593561	-0.106054893	-0.124703538	-0.08145220	-0.06086871	-0.095840094
34	-0.069117521	-0.02971028	-0.08737173	0.045003059	-0.107563657	-0.07999215	-0.06238598	-0.089814953

Lampiran 4 Nilai Eigen dan Vektor Eigen

```
> C <- t(X)%*%X
> C
            [,1]      [,2]       [,3]       [,4]      [,5]        [,6]        [,7]
[1,]  1.00000000 0.3726738 0.06323113 0.00771665 0.1584744 -0.08922759 -0.05116401
[2,]  0.37267379 1.0000000 0.85520662 0.86658088 0.8792822  0.74099925  0.77025635
[3,]  0.06323113 0.8552066 1.00000000 0.97354399 0.8805469  0.69212068  0.88379293
[4,]  0.00771665 0.8665809 0.97354399 1.00000000 0.8873886  0.72699655  0.90307454
[5,]  0.15847438 0.8792822 0.88054693 0.88738865 1.0000000  0.54558559  0.96110170
[6,] -0.08922759 0.7409993 0.69212068 0.72699655 0.5455856  1.00000000  0.53182131
[7,] -0.05116401 0.7702563 0.88379293 0.90307454 0.9611017  0.53182131  1.00000000
> e <- eigen(C) #nilai eigen
> e
eigen() decomposition
$values
[1] 5.072353904 1.137678686 0.588791511 0.139662657 0.034575398 0.022882208 0.004055637

$vectors
            [,1]        [,2]        [,3]       [,4]        [,5]        [,6]        [,7]
[1,] -0.04932276  0.92763602  0.07484918  0.1027539  0.31867703  0.12935433 -0.05109122
[2,] -0.41517244  0.25695413  0.20544427 -0.2563459 -0.67109509 -0.08828502  0.44217981
[3,] -0.42768889 -0.04782282 -0.05326337  0.6501401  0.13708157 -0.59739187  0.11665180
[4,] -0.43252392 -0.09955970 -0.02593506  0.4356933 -0.23671188  0.67980890 -0.30714331
[5,] -0.41963770  0.07215639 -0.34437024 -0.4425250 -0.03697611 -0.29100694 -0.64670410
[6,] -0.33403789 -0.19827987  0.80068464 -0.2181661  0.38481191  0.01296704 -0.11028632
[7,] -0.40930097 -0.12940392 -0.43473427 -0.2603705  0.47308036  0.26758708  0.51335444

> T <- e$vectors #nilai vektor eigen
> T
            [,1]        [,2]        [,3]       [,4]        [,5]        [,6]        [,7]
[1,] -0.04932276  0.92763602  0.07484918  0.1027539  0.31867703  0.12935433 -0.05109122
[2,] -0.41517244  0.25695413  0.20544427 -0.2563459 -0.67109509 -0.08828502  0.44217981
[3,] -0.42768889 -0.04782282 -0.05326337  0.6501401  0.13708157 -0.59739187  0.11665180
[4,] -0.43252392 -0.09955970 -0.02593506  0.4356933 -0.23671188  0.67980890 -0.30714331
[5,] -0.41963770  0.07215639 -0.34437024 -0.4425250 -0.03697611 -0.29100694 -0.64670410
[6,] -0.33403789 -0.19827987  0.80068464 -0.2181661  0.38481191  0.01296704 -0.11028632
[7,] -0.40930097 -0.12940392 -0.43473427 -0.2603705  0.47308036  0.26758708  0.51335444
```

Lampiran 5 Matriks Orthogonal

```
> Z <- X%*%T #matriks orthogonal
> Z
             [,1]         [,2]          [,3]          [,4]          [,5]         [,6]          [,7]
 [1,]  0.07173126 -0.031790472 -0.0496301240  0.0754066540 -0.0021117094  0.003838393  1.234990e-02
 [2,] -0.23482140 -0.059587360  0.0537571521  0.2185291846 -0.0461516760  0.011467305 -1.638598e-02
 [3,]  0.07838017 -0.030125809 -0.0285978844  0.0369440076 -0.0054540242  0.015498012 -9.223075e-04
 [4,]  0.06580216 -0.039379055  0.0801644000  0.0016114535  0.0019367486  0.019832090 -1.537352e-02
 [5,]  0.17051367 -0.026103960  0.0356685608 -0.0169349371  0.0132005521 -0.020233683 -3.642984e-03
 [6,]  0.02948949 -0.043679809  0.0713707414  0.0329107367  0.0193799328 -0.019295878  5.369847e-03
 [7,]  0.20470421 -0.019598873  0.0011741571 -0.0141697864 -0.0000938427 -0.004286562 -7.698104e-03
 [8,]  0.04351890 -0.028528951 -0.0243689133  0.0595956560 -0.0289717317  0.026334527 -6.294899e-03
 [9,]  0.25040940 -0.010718354  0.0003174036 -0.0686506333 -0.0028747704  0.003414040  2.940733e-03
[10,]  0.22455916 -0.022227045  0.0313114673 -0.0504262667  0.0087243844  0.009844028 -1.051382e-02
[11,] -0.24592860  1.039770838  0.0433987255  0.0139856237  0.0108348765  0.002913442 -2.010893e-04
[12,] -1.38574458 -0.155758681  0.4934922304 -0.0326817112  0.0362378390  0.011530808  3.736059e-03
[13,] -0.97217754 -0.073330233 -0.3989717011 -0.0530153426  0.0737451585  0.014875601 -4.989610e-03
[14,]  0.10731982 -0.013065108 -0.0916736014 -0.0840700992  0.0079695503 -0.005575477 -2.215025e-02
[15,] -1.12296484 -0.034467998 -0.3215518740 -0.0142517301 -0.0725106485 -0.035863032 -1.194927e-04
[16,] -0.19345228 -0.002545527  0.1629369153 -0.1196622614 -0.1107443023 -0.010871958  6.752056e-03
[17,]  0.11725828 -0.015108654 -0.0611878299 -0.0543810150 -0.0088852063  0.037061824  3.839718e-02
[18,]  0.13366732 -0.029809573 -0.0340884078 -0.0050809321  0.0017255817  0.055684340  5.535442e-03
[19,]  0.05585907 -0.047370463 -0.0615396619  0.1078064777  0.0237576426  0.029199609  1.539535e-02
[20,]  0.11276875 -0.040087963  0.0632536586  0.0140329393  0.0161055636  0.007932650 -1.122068e-02
[21,]  0.17770014 -0.025491952  0.0185976046 -0.0025552196  0.0020441566  0.001571546 -1.067661e-02
[22,]  0.11853650 -0.042808078  0.0992605256 -0.0476190174  0.0571875615 -0.038445661  3.789115e-03
[23,]  0.16537614 -0.009673232 -0.0033263359 -0.0006731804 -0.0373567267 -0.002035591  6.403385e-03
[24,]  0.27219571 -0.008898842 -0.0113878126 -0.0605749229 -0.0105259083  0.013229761 -8.836381e-03
[25,]  0.17528501 -0.022694879  0.0087533620 -0.0111901707  0.0063650270 -0.013397051  7.714215e-04
[26,]  0.16176210 -0.027951618 -0.0283787649  0.0018359282  0.0139732144  0.017682492  1.410994e-02
[27,] -0.06298088 -0.051669764  0.0143042890  0.1125729096  0.0042355460  0.008463614  4.536081e-04
[28,]  0.15250764 -0.029512066 -0.0055864614  0.0317153793  0.0140690243 -0.018515484 -8.935962e-04
[29,]  0.24424953 -0.013846043 -0.0125779498 -0.0530689127  0.0002591096  0.009023899 -5.182406e-04
[30,]  0.24077336 -0.016157393 -0.0092226316 -0.0471409090 -0.0003466589  0.016672792 -5.834451e-03
[31,]  0.20972881 -0.017322053 -0.0235802553  0.0114828541 -0.0030705014 -0.014962206  1.158699e-05
[32,]  0.24345720 -0.011089475 -0.0168781461 -0.0289490581 -0.0040531089 -0.015362959  1.364223e-03
[33,]  0.23433169 -0.016137884  0.0079272558 -0.0274659658  0.0041406638 -0.019524486 -4.783549e-03
[34,]  0.15618462 -0.023233671 -0.0031400936  0.0741322674  0.0172586822 -0.097700742  1.367573e-02
```

Lampiran 6 Penentuan Nilai k

```
> alpha_GRb = alpha_GRR
> set.seed(123)
> i <- 0
> err <- abs((t(alpha_GRb)%*%alpha_GRb)-(t(alpha_GRa)%*%alpha_GRa))
> while (err >= 0.0001){ #proses iterasi
+   i=i+1
+   alpha_GRa <- alpha_GRb
+   K1 <- diag(c((MSE_GRR/alpha_GRb[1,]^2),(MSE_GRR/alpha_GRb[2,]^2),(MSE_GRR/alpha_GRb[3,]^2),
+               (MSE_GRR/alpha_GRb[4,]^2),(MSE_GRR/alpha_GRb[5,]^2),(MSE_GRR/alpha_GRb[6,]^2),
+               (MSE_GRR/alpha_GRb[7,]^2)))
+   K1
+   alpha_GRb <- solve((t(Z)%*%Z)+K1)%*%t(Z)%*%Y
+   alpha_GRb
+   JKS_GRb <- t(Y)%*%Y-t(alpha_GRb)%*%(t(Z)%*%Y)
+   MSE_GRb <- JKS_GRb/(n-p-1)
+   MSE_GRb
+   err <- abs((t(alpha_GRb)%*%alpha_GRb)-(t(alpha_GRb)%*%alpha_GRb))
+   hasil <- data.frame(alpha_GRb, err)
+   print(hasil)
+ }
      alpha_GRb err
1 -0.3729566988   0
2  0.4524780992   0
3  0.0003369351   0
4  0.0003833304   0
5 -0.3671555954   0
6 -0.0152649879   0
7 -0.0358322855   0
```

Lampiran 7 Estimasi Parameter *Jackknife Ridge Regression*

```
> ## ESTIMASI PARAMTER JACKKNIFE RIDGE REGRESSION ##
> I <- I <- diag(p)
> I
     [,1] [,2] [,3] [,4] [,5] [,6] [,7]
[1,]    1    0    0    0    0    0    0
[2,]    0    1    0    0    0    0    0
[3,]    0    0    1    0    0    0    0
[4,]    0    0    0    1    0    0    0
[5,]    0    0    0    0    1    0    0
[6,]    0    0    0    0    0    1    0
[7,]    0    0    0    0    0    0    1
> A <- t(Z)%*%Z+K1
> A
              [,1]          [,2]         [,3]          [,4]          [,5]          [,6]          [,7]
[1,]  5.085994e+00  6.609296e-16 7.479911e-16 -1.113692e-15 -3.608225e-16 -3.001072e-16 -7.979728e-17
[2,]  6.609296e-16  1.146931e+00 2.180602e-17  6.331741e-17 -2.269235e-16 -1.821460e-17  2.456802e-16
[3,]  7.479911e-16  2.180602e-17 4.927469e+01  1.567756e-16  3.893506e-16  1.276106e-16  2.537914e-16
[4,] -1.113692e-15  6.331741e-17 1.567756e-16  1.915678e+01 -2.183583e-16 -2.732189e-16 -3.230922e-17
[5,] -3.608225e-16 -2.269235e-16 3.893506e-16 -2.183583e-16  4.601456e-02 -1.988427e-16 -3.187283e-16
[6,] -3.001072e-16 -1.821460e-17 1.276106e-16 -2.732189e-16 -1.988427e-16  3.159596e-01 -1.671840e-16
[7,] -7.979728e-17  2.456802e-16 2.537914e-16 -3.230922e-17 -3.187283e-16 -1.671840e-16  5.653745e-02
> alpha_JRR <- (I-((solve(A)%*%K1)^2))%*%alpha_ols
> alpha_JRR
              [,1]
[1,] -0.3739569462
[2,]  0.4561282317
[3,]  0.0006698441
[4,]  0.0007638661
[5,] -0.4584300375
[6,] -0.0294244655
[7,] -0.0690941907
> beta_JRR <- T%*%alpha_JRR
> beta_JRR
           [,1]
[1,]  0.2953270
[2,]  0.5520983
[3,]  0.0852605
[4,]  0.2263834
[5,]  0.2594675
[6,] -0.1343263
[7,] -0.1666716
```

Lampiran 8 Estimasi Parameter *Jackknife Ridge MM-Estimator*

```
> ## Estimasiparameter Jackknife Ridge MM-Estimator
> alpha_JRMM <- (I-((solve(A)%*%K1*I)^2))%*%alpha_MM
> alpha_JRMM
             [,1]
[1,] -0.342620053
[2,]  0.465893877
[3,]  0.002409054
[4,]  0.001552686
[5,]  0.020689818
[6,]  0.002089923
[7,] -0.011934358
> beta_JRMM <- T %*% alpha_JRMM
> beta_JRMM
           [,1]
[1,] 0.45689222
[2,] 0.24271018
[3,] 0.12533110
[4,] 0.10260991
[5,] 0.18222159
[6,] 0.03296584
[7,] 0.08271528
```