Contents

Order 1: DOES NOT GIVE RESULTS

```
clc;clear all;
define_constants;
mpcb = loadcase('case118'); % load base case
mpct = mpcb; % set up target case with
mpopt = mpoption('pf.tol', 1e-3,'pf.nr.max_it', 100,'pf.enforce_q_lims',1,'out.all', 1, 'verbose',
3);
mpct.gen(:,PG)=mpct.gen(:,PG)*1.82736;
mpct.gen(:,QG)=mpct.gen(:,QG)*1.82736;
mpct.bus(:, PD) = mpcb.bus(:, PD)*1.82736; % and increased load
mpct.bus(:, QD) = mpcb.bus(:, PD)*1.82736; % and increased load
results = runpf(mpct, mpopt);
```

```
MATPOWER Version 5.1, 20-Mar-2015 -- AC Power Flow (Newton)

 it    max P & Q mismatch (p.u.)
----  --------------------------
  0         5.017e+00
  1         3.980e-01
  2         9.195e-03
  3         7.364e-06
Newton's method power flow converged in 3 iterations.
Gen 1 at upper Q limit, converting to PQ bus
Gen 3 at upper Q limit, converting to PQ bus
Gen 4 at upper Q limit, converting to PQ bus
Gen 6 at upper Q limit, converting to PQ bus
Gen 7 at upper Q limit, converting to PQ bus
Gen 8 at upper Q limit, converting to PQ bus
Gen 9 at upper Q limit, converting to PQ bus
Gen 15 at upper Q limit, converting to PQ bus
Gen 16 at upper Q limit, converting to PQ bus
Gen 17 at upper Q limit, converting to PQ bus
Gen 20 at upper Q limit, converting to PQ bus
Gen 21 at upper Q limit, converting to PQ bus
Gen 23 at upper Q limit, converting to PQ bus
Gen 24 at upper Q limit, converting to PQ bus
Gen 25 at upper Q limit, converting to PQ bus
Gen 27 at upper Q limit, converting to PQ bus
Gen 31 at upper Q limit, converting to PQ bus
Gen 34 at upper Q limit, converting to PQ bus
Gen 35 at upper Q limit, converting to PQ bus
Gen 36 at upper Q limit, converting to PQ bus
Gen 37 at upper Q limit, converting to PQ bus
Gen 38 at upper Q limit, converting to PQ bus
Gen 41 at upper Q limit, converting to PQ bus
Gen 43 at upper Q limit, converting to PQ bus
Gen 45 at upper Q limit, converting to PQ bus
```

```
Gen 46 at upper Q limit, converting to PQ bus
Gen 47 at upper Q limit, converting to PQ bus
Gen 48 at upper Q limit, converting to PQ bus
Gen 50 at upper Q limit, converting to PQ bus

 it    max P & Q mismatch (p.u.)
----  --------------------------
  0         5.017e+00
  1         7.681e-01
  2         2.465e-01
  3         6.038e+00
  4         1.999e+03
  5         4.995e+02
  6         1.396e+04
  7         3.504e+03
  8         1.188e+04
  9         1.489e+04
 10         2.084e+04
 11         8.110e+05
 12         2.029e+05
 13         5.075e+04
 14         1.273e+04
 15         1.047e+04
 16         5.438e+03
 17         1.978e+03
 18         1.640e+03
 19         4.376e+05
 20         1.090e+05
 21         2.718e+04
 22         9.831e+05
 23         2.457e+05
 24         6.171e+04
 25         1.549e+04
 26         2.314e+04
 27         5.930e+03
 28         1.014e+04
 29         1.472e+04
 30         2.727e+04
 31         6.835e+03
 32         4.200e+05
 33         1.135e+05
 34         5.140e+05
 35         1.261e+05
 36         3.131e+04
 37         7.981e+03
 38         2.486e+05
 39         6.220e+04
 40         3.886e+05
 41         9.713e+04
 42         2.424e+04
 43         6.030e+03
 44         1.578e+06
 45         8.940e+08
 46         2.235e+08
 47         5.587e+07
 48         1.397e+07
 49         3.492e+06
```

```
 50         8.730e+05
 51         2.184e+05
 52         5.481e+04
 53         6.677e+05
 54         1.669e+05
 55         4.167e+04
 56         1.402e+04
 57         6.629e+04
 58         1.653e+04
 59         1.040e+04
 60         2.619e+03
 61         6.936e+02
 62         1.008e+03
 63         8.364e+03
 64         1.333e+05
 65         3.462e+04
 66         8.678e+03
 67         2.456e+03
 68         8.785e+04
 69         2.199e+04
 70         5.504e+03
 71         3.441e+03
 72         2.009e+05
 73         5.164e+04
 74         5.458e+05
 75         1.376e+05
 76         3.463e+04
 77         9.072e+03
 78         2.328e+03
 79         3.844e+04
 80         3.677e+07
 81         9.677e+06
 82         2.419e+06
 83         1.957e+07
 84         4.893e+06
 85         1.223e+06
 86         3.059e+05
 87         7.645e+04
 88         1.911e+04
 89         1.460e+06
 90         3.658e+05
 91         9.222e+04
 92         2.305e+04
 93         5.767e+03
 94         1.445e+03
 95         2.936e+03
 96         7.275e+02
 97         4.808e+06
 98         1.218e+06
 99         2.979e+05
100         4.168e+06
Newton's method power flow did not converge in 100 iterations.
Gen 2 at upper Q limit, converting to PQ bus
Gen 10 at upper Q limit, converting to PQ bus
Gen 11 at upper Q limit, converting to PQ bus
Gen 12 at upper Q limit, converting to PQ bus
Gen 13 at upper Q limit, converting to PQ bus
```

```
Gen 14 at upper Q limit, converting to PQ bus
Gen 19 at upper Q limit, converting to PQ bus
Gen 26 at upper Q limit, converting to PQ bus
Gen 28 at upper Q limit, converting to PQ bus
Gen 29 at upper Q limit, converting to PQ bus
Gen 30 at upper Q limit, converting to PQ bus
Gen 32 at upper Q limit, converting to PQ bus
Gen 40 at upper Q limit, converting to PQ bus
Gen 42 at upper Q limit, converting to PQ bus
Gen 44 at upper Q limit, converting to PQ bus
Gen 49 at upper Q limit, converting to PQ bus
Gen 51 at upper Q limit, converting to PQ bus
Gen 52 at upper Q limit, converting to PQ bus
Gen 53 at upper Q limit, converting to PQ bus
Gen 5 at lower Q limit, converting to PQ bus
Gen 18 at lower Q limit, converting to PQ bus
Gen 22 at lower Q limit, converting to PQ bus
Gen 33 at lower Q limit, converting to PQ bus
Gen 54 at lower Q limit, converting to PQ bus
Bus 87 is new slack bus

 it    max P & Q mismatch (p.u.)
----  --------------------------
  0         6.423e+02
  1         9.758e+07
  2         2.440e+07
  3         6.099e+06
  4         1.525e+06
  5         3.812e+05
  6         9.530e+04
  7         2.355e+04
  8         4.499e+05
  9         1.121e+05
 10         4.048e+05
 11         9.343e+04
 12         2.367e+04
 13         3.759e+04
 14         1.974e+04
 15         6.100e+03
 16         2.830e+05
 17         7.073e+04
 18         1.768e+04
 19         4.423e+03
 20         1.018e+06
 21         2.546e+05
 22         6.366e+04
 23         1.590e+04
 24         3.937e+03
 25         4.160e+03
 26         1.040e+03
 27         2.124e+05
 28         5.314e+04
 29         2.531e+04
 30         6.321e+03
 31         5.824e+04
 32         1.457e+04
 33         3.649e+03
```

```
34          7.717e+04
35          6.017e+04
36          1.478e+04
37          6.313e+04
38          5.894e+05
39          1.474e+05
40          3.683e+04
41          8.812e+04
42          5.955e+04
43          4.959e+04
44          1.248e+04
45          1.062e+04
46          3.550e+08
47          8.875e+07
48          2.219e+07
49          5.546e+06
50          1.386e+06
51          3.459e+05
52          8.648e+04
53          2.749e+04
54          6.180e+03
55          2.050e+05
56          5.128e+04
57          1.523e+04
58          3.895e+03
59          8.912e+03
60          9.914e+04
61          2.476e+04
62          3.030e+04
63          2.714e+04
64          6.080e+03
65          1.866e+04
66          5.736e+04
67          2.107e+04
68          5.355e+03
69          1.345e+04
70          1.503e+04
71          8.668e+03
72          2.176e+03
73          3.732e+06
74          9.332e+05
75          2.332e+05
76          5.840e+04
77          1.476e+04
78          1.155e+04
79          8.330e+03
80          8.246e+04
81          3.853e+05
82          9.621e+04
83          2.405e+04
84          8.893e+04
85          3.633e+06
86          9.046e+05
87          2.077e+05
88          5.189e+04
89          1.301e+04
90          2.508e+05
```

```
 91         6.266e+04
 92         1.609e+04
 93         2.072e+04
 94         6.468e+03
 95         1.461e+04
 96         1.302e+05
 97         4.874e+05
 98         1.219e+05
 99         3.047e+04
100         7.629e+03
Newton's method power flow did not converge in 100 iterations.
All 1 remaining gens exceed their Q limits : INFEASIBLE PROBLEM

>>>>>  Did NOT converge (0.35 seconds)  <<<<<
```

Order 2: GIVES A CONVERGED SOLUTION !!!

```
clc;clear all;
define_constants;
mpcb = loadcase('case118'); % load base case
mpct = mpcb; % set up target case with
mpopt = mpoption('pf.tol', 1e-3,'pf.nr.max_it', 100,'pf.enforce_q_lims',1,'out.all', 1, 'verbose',
3);
mpct.bus(:,PD)=mpcb.bus(:,PD)*1.82736;
mpct.gen(:,PG)=mpcb.gen(:,PG)*1.82736;
mpct.bus(:,QD)=mpcb.bus(:,QD)*1.82736;
mpct.gen(:,QG)=mpcb.gen(:,QG)*1.82736;
results1 = runpf(mpct, mpopt);
```

```
MATPOWER Version 5.1, 20-Mar-2015 -- AC Power Flow (Newton)

 it    max P & Q mismatch (p.u.)
----  --------------------------
  0         5.017e+00
  1         3.980e-01
  2         6.682e-03
  3         3.186e-06
Newton's method power flow converged in 3 iterations.
Gen 1 at upper Q limit, converting to PQ bus
Gen 3 at upper Q limit, converting to PQ bus
Gen 4 at upper Q limit, converting to PQ bus
Gen 6 at upper Q limit, converting to PQ bus
Gen 7 at upper Q limit, converting to PQ bus
Gen 8 at upper Q limit, converting to PQ bus
Gen 9 at upper Q limit, converting to PQ bus
Gen 15 at upper Q limit, converting to PQ bus
Gen 16 at upper Q limit, converting to PQ bus
Gen 17 at upper Q limit, converting to PQ bus
Gen 21 at upper Q limit, converting to PQ bus
Gen 23 at upper Q limit, converting to PQ bus
Gen 24 at upper Q limit, converting to PQ bus
Gen 25 at upper Q limit, converting to PQ bus
Gen 27 at upper Q limit, converting to PQ bus
```

```
Gen 31 at upper Q limit, converting to PQ bus
Gen 34 at upper Q limit, converting to PQ bus
Gen 35 at upper Q limit, converting to PQ bus
Gen 36 at upper Q limit, converting to PQ bus
Gen 38 at upper Q limit, converting to PQ bus
Gen 43 at upper Q limit, converting to PQ bus
Gen 45 at upper Q limit, converting to PQ bus
Gen 46 at upper Q limit, converting to PQ bus
Gen 47 at upper Q limit, converting to PQ bus
Gen 48 at upper Q limit, converting to PQ bus
Gen 50 at upper Q limit, converting to PQ bus

 it    max P & Q mismatch (p.u.)
----  --------------------------
  0         5.017e+00
  1         3.975e-01
  2         1.274e-02
  3         3.844e-05
Newton's method power flow converged in 3 iterations.
Gen 28 at upper Q limit, converting to PQ bus
Gen 37 at upper Q limit, converting to PQ bus

 it    max P & Q mismatch (p.u.)
----  --------------------------
  0         5.017e+00
  1         3.975e-01
  2         1.268e-02
  3         4.509e-05
Newton's method power flow converged in 3 iterations.

Converged in 0.14 seconds
================================================================================
|     System Summary                                                           |
================================================================================

How many?                How much?              P (MW)            Q (MVAr)
---------------------    --------------------  -------------  -----------------
Buses            118     Total Gen Capacity    9966.2       -7345.0 to 11777.0
Generators        54     On-line Capacity      9966.2       -7345.0 to 11777.0
Committed Gens    54     Generation (actual)   8250.5            4122.8
Loads             99     Load                  7751.7            2627.7
  Fixed           99       Fixed               7751.7            2627.7
  Dispatchable     0       Dispatchable          -0.0 of -0.0      -0.0
Shunts            14     Shunt (inj)            -0.0              73.5
Branches         186     Losses (I^2 * Z)       498.86           2855.66
Transformers       9     Branch Charging (inj)     -             1287.1
Inter-ties         0     Total Inter-tie Flow     0.0               0.0
Areas              1

                          Minimum                      Maximum
                  -------------------------  --------------------------------
Voltage Magnitude   0.845 p.u. @ bus 76          1.050 p.u. @ bus 10
Voltage Angle     -20.59 deg   @ bus 41        43.44 deg   @ bus 89
P Losses (I^2*R)             -                22.47 MW    @ line 25-27
Q Losses (I^2*X)             -               203.95 MVAr  @ line 9-10

================================================================================
```

| Area Summary |

Area Num	# of Buses	# of Gens Total	# of Gens Online	# of Loads Total	# of Loads Fixed	# of Loads Disp	# of Shunt	# of Brchs	# of Xfmrs	# of Ties
1	118	54	54	99	99	0	14	186	9	0
Tot:	118	54	54	99	99	0	14	186	9	0

Area Num	Total Gen Capacity MW	Total Gen Capacity MVAr	On-line Gen Capacity MW	On-line Gen Capacity MVAr	Generation MW	Generation MVAr
1	9966.2	-7345.0 to 11777.0	9966.2	-7345.0 to 11777.0	8250.5	4122.8
Tot:	9966.2	-7345.0 to 11777.0	9966.2	-7345.0 to 11777.0	8250.5	4122.8

Area Num	Disp Load Cap MW	Disp Load Cap MVAr	Disp Load MW	Disp Load MVAr	Fixed Load MW	Fixed Load MVAr	Total Load MW	Total Load MVAr
1	-0.0	-0.0	-0.0	-0.0	7751.7	2627.7	7751.7	2627.7
Tot:	-0.0	-0.0	-0.0	-0.0	7751.7	2627.7	7751.7	2627.7

Area Num	Shunt Inj MW	Shunt Inj MVAr	Branch Charging	Series Losses MW	Series Losses MVAr	Net Export MW	Net Export MVAr
1	-0.0	73.5	1287.1	498.86	2855.66	0.0	0.0
Tot:	-0.0	73.5	1287.1	498.86	2855.66	-	-

| Generator Data |

Gen #	Bus #	Status	Pg (MW)	Qg (MVAr)
1	1	1	0.00	15.00
2	4	1	0.00	139.09
3	6	1	0.00	50.00
4	8	1	0.00	300.00
5	10	1	822.31	80.91
6	12	1	155.33	120.00
7	15	1	0.00	30.00
8	18	1	0.00	50.00
9	19	1	0.00	24.00
10	24	1	0.00	28.85
11	25	1	402.02	90.68
12	26	1	573.79	94.44
13	27	1	0.00	89.44
14	31	1	12.79	98.37
15	32	1	0.00	42.00
16	34	1	0.00	24.00
17	36	1	0.00	24.00
18	40	1	0.00	159.05
19	42	1	0.00	143.03
20	46	1	34.72	86.56
21	49	1	372.78	210.00

22	54	1	87.71	181.47
23	55	1	0.00	23.00
24	56	1	0.00	15.00
25	59	1	283.24	180.00
26	61	1	292.38	8.94
27	62	1	0.00	20.00
28	65	1	714.50	200.00
29	66	1	716.33	54.64
30	69	1	1195.07	40.11
31	70	1	0.00	32.00
32	72	1	0.00	3.74
33	73	1	0.00	56.02
34	74	1	0.00	9.00
35	76	1	0.00	23.00
36	77	1	0.00	70.00
37	80	1	871.65	280.00
38	85	1	0.00	23.00
39	87	1	7.31	27.25
40	89	1	1109.21	94.74
41	90	1	0.00	152.77
42	91	1	0.00	11.74
43	92	1	0.00	9.00
44	99	1	0.00	40.97
45	100	1	460.49	155.00
46	103	1	73.09	40.00
47	104	1	0.00	23.00
48	105	1	0.00	23.00
49	107	1	0.00	86.13
50	110	1	0.00	23.00
51	111	1	65.78	19.90
52	112	1	0.00	115.38
53	113	1	0.00	101.47
54	116	1	0.00	80.08
			--------	--------
		Total:	8250.51	4122.76

Bus Data

Bus #	Voltage Mag(pu)	Voltage Ang(deg)	Generation P (MW)	Generation Q (MVAr)	Load P (MW)	Load Q (MVAr)
1	0.904	-13.813	0.00	15.00	93.20	49.34
2	0.926	-12.502	-	-	36.55	16.45
3	0.924	-11.950	-	-	71.27	18.27
4	0.998	-4.923	0.00	139.09	71.27	21.93
5	0.995	-3.950	-	-	-	-
6	0.969	-9.078	0.00	50.00	95.02	40.20
7	0.963	-9.872	-	-	34.72	3.65
8	1.005	5.562	0.00	300.00	51.17	0.00
9	1.015	19.416	-	-	-	-
10	1.050	33.588	822.31	80.91	-	-
11	0.953	-9.538	-	-	127.92	42.03
12	0.957	-10.459	155.33	120.00	85.89	18.27
13	0.918	-12.212	-	-	62.13	29.24
14	0.944	-11.844	-	-	25.58	1.83
15	0.923	-12.477	0.00	30.00	164.46	54.82

16	0.943	-11.005	-	-	45.68	18.27
17	0.967	-7.442	-	-	20.10	5.48
18	0.928	-11.882	0.00	50.00	109.64	62.13
19	0.914	-12.917	0.00	24.00	82.23	45.68
20	0.892	-11.159	-	-	32.89	5.48
21	0.888	-7.872	-	-	25.58	14.62
22	0.910	-2.613	-	-	18.27	9.14
23	0.982	6.940	-	-	12.79	5.48
24	0.992	7.061	0.00	28.85	23.76	0.00
25	1.050	19.760	402.02	90.68	-	-
26	1.015	23.104	573.79	94.44	-	-
27	0.968	-5.089	0.00	89.44	129.74	23.76
28	0.955	-8.290	-	-	31.07	12.79
29	0.959	-10.178	-	-	43.86	7.31
30	0.946	2.457	-	-	-	-
31	0.967	-9.993	12.79	98.37	78.58	49.34
32	0.960	-6.068	0.00	42.00	107.81	42.03
33	0.912	-13.303	-	-	42.03	16.45
34	0.932	-11.616	0.00	24.00	107.81	47.51
35	0.925	-12.541	-	-	60.30	16.45
36	0.925	-12.553	0.00	24.00	56.65	31.07
37	0.941	-10.624	-	-	-	-
38	0.904	-0.188	-	-	-	-
39	0.943	-17.768	-	-	49.34	20.10
40	0.970	-20.055	0.00	159.05	120.61	42.03
41	0.960	-20.590	-	-	67.61	18.27
42	0.985	-16.909	0.00	143.03	175.43	42.03
43	0.902	-11.031	-	-	32.89	12.79
44	0.908	-4.850	-	-	29.24	14.62
45	0.924	-0.882	-	-	96.85	40.20
46	1.005	4.275	34.72	86.56	51.17	18.27
47	0.995	9.478	-	-	62.13	0.00
48	0.999	7.713	-	-	36.55	20.10
49	1.006	9.672	372.78	210.00	158.98	54.82
50	0.975	5.604	-	-	31.07	7.31
51	0.930	0.295	-	-	31.07	14.62
52	0.917	-1.668	-	-	32.89	9.14
53	0.918	-3.745	-	-	42.03	20.10
54	0.955	-2.160	87.71	181.47	206.49	58.48
55	0.944	-2.573	0.00	23.00	115.12	40.20
56	0.947	-2.247	0.00	15.00	153.50	32.89
57	0.950	0.358	-	-	21.93	5.48
58	0.932	-1.360	-	-	21.93	5.48
59	0.974	6.649	283.24	180.00	506.18	206.49
60	0.989	13.998	-	-	142.53	5.48
61	0.995	15.650	292.38	8.94	-	-
62	0.993	14.547	0.00	20.00	140.71	25.58
63	0.956	13.240	-	-	-	-
64	0.976	16.719	-	-	-	-
65	1.004	23.008	714.50	200.00	-	-
66	1.050	22.347	716.33	54.64	71.27	32.89
67	1.010	17.352	-	-	51.17	12.79
68	1.003	23.552	-	-	-	-
69	1.035	30.000*	1195.07	40.11	-	-
70	0.944	13.286	0.00	32.00	120.61	36.55
71	0.966	11.951	-	-	-	-
72	0.980	8.234	0.00	3.74	21.93	0.00

73	0.991	11.360	0.00	56.02	10.96	0.00
74	0.879	11.532	0.00	9.00	124.26	49.34
75	0.892	14.387	-	-	85.89	20.10
76	0.845	11.337	0.00	23.00	124.26	65.78
77	0.967	21.485	0.00	70.00	111.47	51.17
78	0.960	20.865	-	-	129.74	47.51
79	0.968	21.411	-	-	71.27	58.48
80	1.032	25.411	871.65	280.00	237.56	47.51
81	0.994	24.281	-	-	-	-
82	0.924	21.505	-	-	98.68	49.34
83	0.921	23.523	-	-	36.55	18.27
84	0.929	27.791	-	-	20.10	12.79
85	0.949	30.420	0.00	23.00	43.86	27.41
86	0.953	27.696	-	-	38.37	18.27
87	1.015	28.099	7.31	27.25	-	-
88	0.961	36.104	-	-	87.71	18.27
89	1.005	43.437	1109.21	94.74	-	-
90	0.985	31.215	0.00	152.77	297.86	76.75
91	0.980	31.107	0.00	11.74	18.27	0.00
92	0.961	32.691	0.00	9.00	118.78	18.27
93	0.936	27.272	-	-	21.93	12.79
94	0.934	23.352	-	-	54.82	29.24
95	0.913	21.687	-	-	76.75	56.65
96	0.934	21.781	-	-	69.44	27.41
97	0.972	22.966	-	-	27.41	16.45
98	0.995	21.822	-	-	62.13	14.62
99	1.010	20.008	0.00	40.97	76.75	0.00
100	0.981	21.843	460.49	155.00	67.61	32.89
101	0.941	24.734	-	-	40.20	27.41
102	0.950	29.884	-	-	9.14	5.48
103	0.949	14.202	73.09	40.00	42.03	29.24
104	0.915	8.084	0.00	23.00	69.44	45.68
105	0.917	5.536	0.00	23.00	56.65	47.51
106	0.909	5.044	-	-	78.58	29.24
107	0.952	-1.528	0.00	86.13	91.37	21.93
108	0.925	2.953	-	-	3.65	1.83
109	0.929	1.979	-	-	14.62	5.48
110	0.950	0.114	0.00	23.00	71.27	54.82
111	0.980	2.888	65.78	19.90	-	-
112	0.975	-6.262	0.00	115.38	124.26	23.76
113	0.993	-7.933	0.00	101.47	10.96	0.00
114	0.953	-6.686	-	-	14.62	5.48
115	0.953	-6.703	-	-	40.20	12.79
116	1.005	22.761	0.00	80.08	336.23	0.00
117	0.923	-13.501	-	-	36.55	14.62
118	0.856	11.968	-	-	60.30	27.41
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		Total:	8250.51	4122.76	7751.66	2627.74

Branch Data								
Brnch #	From Bus	To Bus	From Bus Injection P (MW)	From Bus Injection Q (MVAr)	To Bus Injection P (MW)	To Bus Injection Q (MVAr)	Loss (I^2 * Z) P (MW)	Loss (I^2 * Z) Q (MVAr)
1	1	2	-22.97	-13.56	23.22	12.28	0.254	0.84
2	1	3	-70.23	-20.77	71.07	22.65	0.844	2.77

3	4	5	-192.37	85.73	193.15	-82.38	0.784	3.56
4	3	5	-123.92	-25.84	128.43	43.42	4.507	20.20
5	5	6	163.55	17.36	-160.29	-3.96	3.256	14.78
6	6	7	65.27	13.75	-65.05	-13.28	0.218	0.99
7	8	9	-790.48	67.03	805.97	8.13	15.492	193.65
8	8	5	627.77	148.19	-627.77	-41.37	0.000	106.82
9	9	10	-805.97	-8.13	822.31	80.91	16.341	203.95
10	4	11	121.10	31.44	-117.81	-22.25	3.296	10.85
11	5	11	142.64	23.40	-138.35	-10.62	4.296	14.43
12	11	12	63.91	-36.09	-63.56	36.79	0.352	1.16
13	2	12	-59.77	-28.72	60.72	30.46	0.951	3.13
14	3	12	-18.42	-15.08	18.71	12.46	0.293	0.97
15	7	12	30.33	9.63	-30.24	-10.06	0.095	0.37
16	11	13	64.33	26.93	-63.13	-24.63	1.202	3.95
17	12	14	33.27	6.98	-32.99	-7.72	0.274	0.90
18	13	15	1.00	-4.61	-0.99	-0.68	0.004	0.01
19	14	15	7.41	5.89	-7.33	-10.00	0.081	0.26
20	12	16	13.40	11.15	-13.33	-12.79	0.076	0.30
21	15	17	-188.27	-31.80	193.90	46.49	5.635	18.66
22	16	17	-32.36	-5.49	32.90	3.37	0.540	2.14
23	17	18	148.40	43.41	-145.25	-31.65	3.149	12.93
24	18	19	35.61	19.52	-35.39	-19.53	0.217	0.95
25	19	20	-16.91	19.47	17.13	-20.90	0.216	1.00
26	15	19	20.93	14.31	-20.84	-14.86	0.092	0.30
27	20	21	-50.02	15.41	50.66	-14.18	0.636	2.95
28	21	22	-76.24	-0.44	77.78	5.60	1.539	7.14
29	22	23	-96.05	-14.74	99.94	29.18	3.884	18.06
30	23	24	-8.90	-19.61	8.95	14.95	0.053	0.19
31	23	25	-285.16	0.28	298.32	58.25	13.154	67.46
32	26	25	169.50	25.13	-169.50	-15.10	0.000	10.03
33	25	27	273.20	47.53	-250.73	49.68	22.474	115.20
34	27	28	61.03	1.96	-60.26	-0.55	0.762	3.41
35	28	29	29.20	-12.24	-28.94	11.08	0.254	1.01
36	30	17	422.18	81.05	-422.18	-7.14	0.000	73.91
37	8	30	111.54	84.79	-110.49	-121.36	1.055	12.34
38	26	30	404.29	69.31	-390.57	-8.98	13.722	147.69
39	17	31	24.64	-8.48	-24.31	5.84	0.330	1.09
40	29	31	-14.91	-18.39	14.98	17.81	0.064	0.20
41	23	32	181.33	-15.32	-170.50	43.68	10.837	39.42
42	31	32	-56.45	25.38	57.70	-23.61	1.240	4.10
43	27	32	22.30	3.28	-22.18	-4.66	0.126	0.41
44	15	33	11.20	3.36	-11.13	-5.83	0.066	0.22
45	19	34	-9.09	-6.77	9.18	1.68	0.090	0.29
46	35	36	1.62	-0.81	-1.62	0.58	0.000	0.00
47	35	37	-61.92	-15.64	62.44	16.85	0.522	2.36
48	33	37	-30.90	-10.62	31.42	9.25	0.518	1.77
49	34	36	55.35	8.12	-55.03	-7.65	0.314	0.97
50	34	37	-171.49	-36.65	172.40	39.11	0.904	3.32
51	38	37	439.31	106.01	-439.31	-24.03	0.000	81.98
52	37	39	96.69	-25.59	-93.09	35.10	3.605	11.91
53	37	40	76.37	-37.73	-71.60	47.40	4.767	13.51
54	30	38	78.88	49.29	-78.31	-78.83	0.564	6.56
55	39	40	43.75	-55.20	-42.74	57.10	1.011	3.33
56	40	41	21.97	13.31	-21.86	-14.10	0.104	0.35
57	40	42	-28.24	-0.79	28.71	-2.11	0.471	1.55
58	41	42	-45.75	-4.17	46.68	4.00	0.934	3.08
59	43	44	-33.88	5.69	34.79	-6.99	0.908	3.67

60	34	43	-0.84	15.51	0.99	-18.48	0.143	0.58
61	44	45	-64.03	0.61	65.14	2.00	1.116	4.49
62	45	46	-70.86	-32.92	73.67	39.37	2.817	9.55
63	46	47	-62.45	28.28	64.26	-25.41	1.803	6.03
64	46	48	-27.67	10.74	28.22	-13.72	0.558	1.75
65	47	49	-9.97	-15.63	10.03	14.23	0.062	0.20
66	42	49	-125.41	49.55	139.12	3.89	13.717	61.97
67	42	49	-125.41	49.55	139.12	3.89	13.717	61.97
68	45	49	-91.14	-0.75	97.79	14.70	6.655	18.10
69	48	49	-64.77	8.58	65.54	-7.68	0.768	2.17
70	49	50	96.36	9.74	-93.88	-4.60	2.479	6.98
71	49	51	119.40	21.23	-112.31	-4.44	7.097	20.01
72	51	52	51.00	3.35	-50.38	-2.76	0.614	1.78
73	52	53	17.49	-6.37	-17.33	3.60	0.158	0.64
74	53	54	-24.70	-23.70	25.05	22.59	0.347	1.61
75	49	54	70.00	3.47	-66.43	3.56	3.570	14.13
76	49	54	68.94	0.44	-64.85	6.25	4.094	13.71
77	54	55	12.18	11.61	-12.12	-13.19	0.057	0.24
78	54	56	35.23	71.81	-35.04	-71.80	0.194	0.68
79	55	56	-36.21	-8.24	36.29	8.14	0.075	0.23
80	56	57	-38.31	10.22	38.92	-10.68	0.610	1.72
81	50	57	62.82	-2.71	-60.85	5.19	1.968	5.56
82	56	58	-7.86	16.64	8.00	-18.37	0.144	0.40
83	51	58	30.25	-13.54	-29.93	12.88	0.318	0.90
84	54	59	-59.97	7.17	62.00	-3.45	2.037	9.29
85	56	59	-53.06	8.93	55.77	-5.92	2.712	8.25
86	56	59	-55.52	9.99	58.42	-6.31	2.899	8.63
87	55	59	-66.79	4.23	69.19	1.50	2.398	10.92
88	59	60	-82.15	11.45	84.46	-4.50	2.312	10.58
89	59	61	-97.64	14.02	101.02	-2.32	3.381	15.46
90	60	61	-209.56	2.71	210.74	1.91	1.184	6.06
91	60	62	-17.44	-3.69	17.48	2.43	0.039	0.18
92	61	62	49.29	-6.46	-49.08	6.43	0.205	0.94
93	63	59	288.52	72.21	-288.52	-37.78	0.000	34.43
94	63	64	-288.52	-72.21	290.16	71.12	1.640	19.07
95	64	61	68.68	-14.47	-68.68	15.81	0.000	1.34
96	38	65	-361.00	-27.18	375.41	89.38	14.404	157.63
97	64	65	-358.84	-56.65	362.52	60.69	3.678	41.29
98	49	66	-246.69	27.12	257.65	26.22	10.962	55.97
99	49	66	-246.69	27.12	257.65	26.22	10.962	55.97
100	62	66	-66.41	-9.55	68.59	13.36	2.176	9.84
101	62	67	-42.69	-4.89	43.17	3.96	0.479	2.17
102	65	66	35.17	68.98	-35.17	-67.05	0.000	1.92
103	66	67	96.34	23.00	-94.33	-16.75	2.008	9.10
104	65	68	-58.60	-19.05	58.65	-44.60	0.049	0.57
105	47	69	-116.42	41.05	129.67	-4.75	13.248	43.60
106	49	69	-99.13	37.02	110.35	-8.76	11.213	36.88
107	68	69	-336.88	127.31	336.88	-85.58	0.000	41.73
108	69	70	233.41	45.24	-217.40	10.56	16.009	67.77
109	24	70	-24.60	8.10	24.61	-14.41	0.017	3.25
110	70	71	42.56	-69.81	-41.90	71.65	0.657	2.64
111	24	72	-8.11	5.80	8.18	-10.28	0.066	0.26
112	71	72	30.65	-16.03	-30.10	14.01	0.542	2.19
113	71	73	11.26	-55.62	-10.96	56.02	0.293	1.54
114	70	74	30.42	35.54	-29.38	-34.93	1.034	3.41
115	70	75	-0.79	33.57	1.39	-34.65	0.595	1.96
116	69	75	228.09	67.16	-206.36	-13.28	21.729	65.45

117	74	75	-94.88	3.87	96.31	0.06	1.435	4.74
118	76	77	-106.12	-30.71	113.66	52.81	7.541	25.14
119	69	77	156.68	26.80	-149.30	-13.08	7.383	24.13
120	75	77	-57.29	-15.20	59.90	19.58	2.613	8.69
121	77	78	89.17	26.38	-88.82	-26.41	0.349	1.15
122	78	79	-40.92	-21.10	41.05	21.06	0.125	0.56
123	77	80	-164.50	-69.30	170.24	80.93	5.734	16.36
124	77	80	-75.35	-37.59	77.55	43.18	2.203	7.87
125	79	80	-112.31	-60.79	115.01	71.09	2.697	12.17
126	68	81	-58.42	9.06	58.52	-88.39	0.102	1.18
127	81	80	-58.52	88.39	58.52	-84.71	0.000	3.68
128	77	82	14.95	40.03	-14.27	-45.39	0.684	1.96
129	82	83	-72.29	29.40	73.10	-29.98	0.812	2.66
130	83	84	-40.77	14.66	42.18	-13.90	1.408	2.97
131	83	85	-68.88	5.52	71.31	-0.20	2.430	8.36
132	84	85	-62.28	1.11	63.64	0.69	1.359	2.88
133	85	86	31.76	-12.37	-31.32	11.42	0.440	1.55
134	86	87	-7.06	-29.70	7.31	27.25	0.254	1.86
135	85	88	-86.48	9.09	88.17	-3.01	1.685	8.59
136	85	89	-124.08	-1.62	128.17	26.71	4.087	29.59
137	88	89	-175.88	-15.26	180.57	37.42	4.690	24.02
138	89	90	109.40	-10.18	-103.23	27.34	6.167	22.38
139	89	90	208.50	-12.46	-198.25	44.93	10.256	42.96
140	90	91	3.62	3.75	-3.61	-5.79	0.009	0.03
141	89	92	366.25	45.80	-352.87	17.14	13.379	68.25
142	89	92	116.32	7.44	-111.02	9.87	5.300	21.32
143	91	92	-14.66	17.52	14.89	-19.84	0.234	0.77
144	92	93	101.06	1.85	-98.21	5.56	2.854	9.38
145	92	94	91.17	-5.22	-86.84	15.80	4.332	14.23
146	93	94	76.28	-18.35	-74.72	21.83	1.560	5.12
147	94	95	64.96	25.63	-64.22	-24.13	0.742	2.44
148	80	96	43.00	45.67	-41.60	-43.32	1.397	7.14
149	82	96	-12.12	-16.27	12.18	11.79	0.065	0.21
150	94	96	25.04	-8.95	-24.83	7.63	0.213	0.69
151	80	97	56.86	54.86	-55.76	-51.81	1.098	5.60
152	80	98	64.65	21.60	-63.59	-19.77	1.053	4.78
153	80	99	48.27	-0.13	-47.27	-1.04	0.996	4.52
154	92	100	57.25	-15.46	-54.83	22.03	2.422	11.03
155	94	100	16.73	-83.55	-15.34	82.56	1.394	4.54
156	95	96	-12.53	-32.52	12.77	32.03	0.241	0.77
157	96	97	-27.96	-35.54	28.35	35.36	0.391	2.00
158	98	100	1.46	5.15	-1.44	-9.69	0.023	0.11
159	99	100	-29.48	42.01	29.96	-41.98	0.481	2.17
160	100	101	-28.49	36.68	29.15	-36.72	0.655	2.98
161	92	102	80.72	2.37	-79.86	0.24	0.868	3.95
162	101	102	-69.35	9.31	70.72	-5.72	1.367	6.22
163	100	103	236.96	1.41	-227.62	24.24	9.337	30.64
164	100	104	109.14	17.44	-103.37	3.79	5.770	26.10
165	103	104	60.01	3.53	-58.13	-0.68	1.879	6.39
166	103	105	80.10	-3.51	-76.28	11.55	3.815	11.59
167	100	106	116.93	13.67	-108.16	13.98	8.769	33.19
168	104	105	92.06	-25.79	-90.98	29.08	1.082	4.11
169	105	106	15.50	8.92	-15.45	-9.90	0.055	0.22
170	105	107	50.38	-30.56	-48.27	33.74	2.115	7.30
171	105	108	44.73	-26.69	-43.90	27.36	0.830	2.24
172	106	107	45.03	-33.31	-43.10	35.90	1.932	6.67
173	108	109	40.25	-29.19	-39.95	29.36	0.301	0.83

174	103	110	118.58	-13.49	-112.42	37.92	6.159	28.59
175	109	110	25.33	-34.85	-24.75	34.65	0.578	1.58
176	110	111	-64.69	-18.02	65.79	19.90	1.091	3.74
177	110	112	130.60	-80.95	-124.26	91.63	6.336	16.42
178	17	113	2.24	-83.13	-1.57	84.60	0.669	2.20
179	32	113	9.68	-20.86	-9.39	16.88	0.290	0.96
180	32	114	17.49	5.41	-17.43	-6.67	0.050	0.23
181	27	115	37.66	10.76	-37.39	-11.35	0.272	1.23
182	114	115	2.82	1.19	-2.82	-1.44	0.000	0.00
183	68	116	336.64	-91.76	-336.23	80.08	0.407	4.85
184	12	117	37.13	13.93	-36.55	-14.62	0.582	2.48
185	75	118	80.06	42.96	-78.55	-38.86	1.513	5.02
186	76	118	-18.14	-12.08	18.25	11.45	0.106	0.35
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						Total:	498.856	2855.66

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