Computer Printout for STA302F94 Final Exam

Part 1: The Body Fat data

First we have an analysis of the body fat example you looked at for homework. The command file is followed by part of the list file.

```
options linesize=79 pagesize=50;
title 'Diagnostics from Ch. 11 for Final';
data pudgy;
     infile 'bodyfat.dat';
     input subject triceps thigh midarm bodyfat; /* Data on p. 272 */
     label triceps = 'Triceps Skinfold Thickness'
           thigh   = 'Thigh Circumference'
           midarm  = 'Midarm Circumference'
           bodyfat = 'Percent Body Fat';
proc reg simple corr;
     model bodyfat = triceps thigh midarm
           / clm cli r influence partial tol;
```

```
                       Diagnostics from Ch. 11 for Final                      1

                            Descriptive Statistics

Variables                    Sum                Mean

INTERCEP                      20                   1     Intercept
TRICEPS                    506.1              25.305     Triceps Skinfold Thickness
THIGH                     1023.4               51.17     Thigh Circumference
MIDARM                     552.4               27.62     Midarm Circumference
BODYFAT                    403.9              20.195     Percent Body Fat

Variables     Uncorrected SS            Variance

INTERCEP                  20                   0     Intercept
TRICEPS             13286.29        25.233131579     Triceps Skinfold Thickness
THIGH                  52888        27.401157895     Thigh Circumference
MIDARM              15510.02        13.301684211     Midarm Circumference
BODYFAT              8652.15        26.073131579     Percent Body Fat

          Variables      Std Deviation

          INTERCEP                   0     Intercept
          TRICEPS         5.0232590595     Triceps Skinfold Thickness
          THIGH           5.2346115324     Thigh Circumference
          MIDARM          3.6471474073     Midarm Circumference
          BODYFAT         5.1061856193     Percent Body Fat
```

Correlation

CORR	TRICEPS	THIGH	
TRICEPS	1.0000	0.9238	Triceps Skinfold Thickness
THIGH	0.9238	1.0000	Thigh Circumference
MIDARM	0.4578	0.0847	Midarm Circumference
BODYFAT	0.8433	0.8781	Percent Body Fat

CORR	MIDARM	BODYFAT	
TRICEPS	0.4578	0.8433	Triceps Skinfold Thickness
THIGH	0.0847	0.8781	Thigh Circumference
MIDARM	1.0000	0.1424	Midarm Circumference
BODYFAT	0.1424	1.0000	Percent Body Fat

Model: MODEL1
Dependent Variable: BODYFAT   Percent Body Fat

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	396.98461	132.32820	21.516	0.0001
Error	16	98.40489	6.15031		
C Total	19	495.38950			

Root MSE	2.47998	R-square	0.8014
Dep Mean	20.19500	Adj R-sq	0.7641
C.V.	12.28017		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	117.084695	99.78240295	1.173	0.2578
TRICEPS	1	4.334092	3.01551136	1.437	0.1699
THIGH	1	-2.856848	2.58201527	-1.106	0.2849
MIDARM	1	-2.186060	1.59549900	-1.370	0.1896

Variable	DF	Tolerance	Variable Label
INTERCEP	1	.	Intercept
TRICEPS	1	0.00141075	Triceps Skinfold Thickness
THIGH	1	0.00177197	Thigh Circumference
MIDARM	1	0.00955968	Midarm Circumference

Obs	Dep Var BODYFAT	Predict Value	Std Err Predict	Lower95% Mean	Upper95% Mean	Lower95% Predict	Upper95% Predict
1	11.9000	14.8550	1.449	11.7840	17.9259	8.7665	20.9435
2	22.8000	20.2188	0.981	18.1388	22.2989	14.5650	25.8727
3	18.7000	20.9867	1.646	17.4977	24.4757	14.6770	27.2964
4	20.1000	23.1273	0.832	21.3645	24.8901	17.5824	28.6723
5	12.9000	11.7576	1.490	8.5984	14.9168	5.6241	17.8911
6	21.7000	22.2437	0.899	20.3372	24.1503	16.6514	27.8360
7	27.1000	25.7143	1.093	23.3967	28.0319	19.9688	31.4598
8	25.4000	22.2706	1.005	20.1404	24.4009	16.5982	27.9431
9	21.3000	19.5948	1.089	17.2865	21.9032	13.8531	25.3366
10	19.3000	20.5484	1.216	17.9701	23.1267	14.6929	26.4039
11	25.4000	24.5956	0.926	22.6330	26.5581	18.9839	30.2072
12	27.2000	24.9923	0.820	23.2543	26.7304	19.4552	30.5295
13	11.7000	15.0094	1.146	12.5798	17.4390	9.2178	20.8010
14	17.8000	13.6723	1.076	11.3923	15.9523	7.9419	19.4027
15	12.8000	11.8119	1.464	8.7092	14.9147	5.7074	17.9165
16	23.9000	23.7275	0.839	21.9494	25.5056	18.1776	29.2773
17	22.6000	22.9736	0.878	21.1124	24.8348	17.3966	28.5506
18	25.4000	26.7859	1.185	24.2740	29.2978	20.9593	32.6125
19	14.8000	18.5263	0.902	16.6136	20.4389	12.9319	24.1207
20	21.1000	20.4879	0.637	19.1375	21.8383	15.0600	25.9159

<table>
<tr><th>Obs</th><th>Residual</th><th>Std Err Residual</th><th>Student Residual</th><th>-2-1-0 1 2</th><th>Cook's D</th><th>Rstudent</th></tr>
<tr><td>1</td><td>-2.9550</td><td>2.013</td><td>-1.468</td><td>| **| |</td><td>0.279</td><td>-1.5280</td></tr>
<tr><td>2</td><td>2.5812</td><td>2.278</td><td>1.133</td><td>| |** |</td><td>0.060</td><td>1.1442</td></tr>
<tr><td>3</td><td>-2.2867</td><td>1.855</td><td>-1.233</td><td>| **| |</td><td>0.299</td><td>-1.2545</td></tr>
<tr><td>4</td><td>-3.0273</td><td>2.336</td><td>-1.296</td><td>| **| |</td><td>0.053</td><td>-1.3261</td></tr>
<tr><td>5</td><td>1.1424</td><td>1.982</td><td>0.576</td><td>| |* |</td><td>0.047</td><td>0.5639</td></tr>
<tr><td>6</td><td>-0.5437</td><td>2.311</td><td>-0.235</td><td>| | |</td><td>0.002</td><td>-0.2282</td></tr>
<tr><td>7</td><td>1.3857</td><td>2.226</td><td>0.622</td><td>| |* |</td><td>0.023</td><td>0.6102</td></tr>
<tr><td>8</td><td>3.1294</td><td>2.267</td><td>1.380</td><td>| |** |</td><td>0.094</td><td>1.4239</td></tr>
<tr><td>9</td><td>1.7052</td><td>2.228</td><td>0.765</td><td>| |* |</td><td>0.035</td><td>0.7549</td></tr>
<tr><td>10</td><td>-1.2484</td><td>2.161</td><td>-0.578</td><td>| *| |</td><td>0.026</td><td>-0.5652</td></tr>
<tr><td>11</td><td>0.8044</td><td>2.301</td><td>0.350</td><td>| | |</td><td>0.005</td><td>0.3399</td></tr>
<tr><td>12</td><td>2.2077</td><td>2.341</td><td>0.943</td><td>| |* |</td><td>0.027</td><td>0.9398</td></tr>
<tr><td>13</td><td>-3.3094</td><td>2.199</td><td>-1.505</td><td>| ***| |</td><td>0.154</td><td>-1.5725</td></tr>
<tr><td>14</td><td>4.1277</td><td>2.235</td><td>1.847</td><td>| |***|</td><td>0.198</td><td>2.0164</td></tr>
<tr><td>15</td><td>0.9881</td><td>2.002</td><td>0.494</td><td>| | |</td><td>0.033</td><td>0.4815</td></tr>
<tr><td>16</td><td>0.1725</td><td>2.334</td><td>0.074</td><td>| | |</td><td>0.000</td><td>0.0716</td></tr>
<tr><td>17</td><td>-0.3736</td><td>2.319</td><td>-0.161</td><td>| | |</td><td>0.001</td><td>-0.1561</td></tr>
<tr><td>18</td><td>-1.3859</td><td>2.179</td><td>-0.636</td><td>| *| |</td><td>0.030</td><td>-0.6239</td></tr>
<tr><td>19</td><td>-3.7263</td><td>2.310</td><td>-1.613</td><td>| ***| |</td><td>0.099</td><td>-1.7068</td></tr>
<tr><td>20</td><td>0.6121</td><td>2.397</td><td>0.255</td><td>| | |</td><td>0.001</td><td>0.2478</td></tr>
</table>

Obs	Hat Diag H	Cov Ratio	Dffits	INTERCEP Dfbetas	TRICEPS Dfbetas	THIGH Dfbetas	MIDARM Dfbetas
1	0.3412	1.1017	-1.0997	-0.7600	-0.7312	0.7595	0.7049
2	0.1565	1.0982	0.4929	0.3991	0.3963	-0.3993	-0.3893
3	0.4404	1.5521	-1.1130	0.3818	0.3436	-0.3420	-0.4389
4	0.1124	0.9361	-0.4720	0.0460	0.0257	-0.0328	-0.0543
5	0.3611	1.8631	0.4239	-0.2114	-0.2217	0.2092	0.2372
6	0.1315	1.4701	-0.0888	-0.0081	-0.0070	0.0056	0.0132
7	0.1943	1.4567	0.2997	-0.1468	-0.1365	0.1456	0.1339
8	0.1642	0.9328	0.6311	0.4224	0.4361	-0.4341	-0.4058
9	0.1928	1.3815	0.3689	0.2254	0.2133	-0.2143	-0.2349
10	0.2405	1.5667	-0.3181	0.2448	0.2472	-0.2502	-0.2341
11	0.1394	1.4587	0.1368	-0.0522	-0.0461	0.0495	0.0505
12	0.1093	1.1561	0.3292	-0.0056	0.0074	0.0026	-0.0052
13	0.2136	0.8941	-0.8195	0.3401	0.3822	-0.3684	-0.3327
14	0.1881	0.6109	0.9705	-0.3965	-0.4308	0.4009	0.4480
15	0.3483	1.8682	0.3520	-0.0735	-0.0953	0.0866	0.0733
16	0.1144	1.4598	0.0257	0.0107	0.0117	-0.0112	-0.0105
17	0.1253	1.4705	-0.0591	0.0263	0.0258	-0.0271	-0.0234
18	0.2283	1.5141	-0.3393	-0.1051	-0.1114	0.1010	0.1260
19	0.1324	0.7336	-0.6666	-0.4830	-0.4670	0.4764	0.4686
20	0.0660	1.3635	0.0659	0.0327	0.0323	-0.0323	-0.0323

```
Sum of Residuals                       0
Sum of Squared Residuals         98.4049
Predicted Resid SS (Press)      160.7366
```

Part 2: The SMSA data

Now we have a model selection analysis (and other stuff) on the SMSA data set. **Here is the beginning of the raw data file**. Notice I have added a few lines at the beginning.

```
 .    .     .     .     .    1778.15  .     54.54  .        .       .      1
 .    .     .     .     .    1778.15  .     54.54  .        .       .      2
 .    .     .     .     .    1778.15  .     54.54  .        .       .      3
 .    .     .     .     .    1778.15  .     54.54  .        .       .      4
 1   1384  9387  78.1  12.3  25627   69678  50.1  4083.9  72100  709234  1
 2   4069  7031  44.0  10.0  15389   39699  62.0  3353.6  52737  499813  4
 3   3719  7017  43.9   9.4  13326   43292  53.9  3305.9  54542  393162  2
 4   3553  4794  37.4  10.7   9724   33731  50.6  2066.3  33216  198102  1
 5   3916  4370  29.9   8.8   6402   24167  52.2  1966.7  32906  294466  2
```

etc.

Now the command file ...

```
options linesize=79 pagesize=500;
title 'STA 302f94:  Final SAS Job -- Model Selection for SMSA Data';

proc format; /* Used to label values of the categorical variables */
     value regfmt    1 =  'Northeast'
                     2 =  'North central'
                     3 =  'South'
                     4 =  'West';
data census;
     infile 'smsa.raw';
     input id landarea totpop urban oldfolks doctors hospbeds hsgrads
           labforce income crimes region;
     label
       id        = 'Identification number'
       landarea  = 'Land area in square miles'
       totpop    = 'Estimated 1977 population in thousands'
       urban     = 'Percent 1976 population in cities'
       oldfolks  = 'Percent 1976 population 65 & older'
       doctors   = 'Number active nonfederal physicians 1977'
       hospbeds  = 'Number hospital beds & cribs 1977'
       hsgrads   = 'Percent of pop 25+ with 12+ trs schooling 1970'
       labforce  = 'Number emp & unemp in civilian labor force 1977'
       income    = 'Total personal income before taxes 1976'
       crimes    = 'Total serious crimes 1977'
       region    = 'Geographic region' ;
     format region regfmt.;
     if region=2 then r1=1;  else r1=0;
     if region=3 then r2=1;  else r2=0;
     if region=4 then r3=1;  else r3=0;
     crimrate = crimes/totpop;
     label crimrate = 'Crime Rate: Serious crimes per thousand pop';
     popdens = totpop/landarea;
     label popdens = 'Population Density';
proc reg simple corr;
     model crimrate = {r1 r2 r3} landarea totpop urban oldfolks doctors
        hospbeds hsgrads labforce income
        / selection = stepwise slentry=.05 slstay=.05
          groupnames = 'region' 'landarea' 'totpop' 'urban' 'oldfolks'
          'doctors' 'hospbeds' 'hsgrads' 'labforce' 'income';
        /* Specifying all names again is a pain, but otherwise group6 etc.
           It's worth it to be able to keep the dummy vars together. */
     model crimrate = r1 r2 r3 landarea totpop urban oldfolks doctors
        hospbeds hsgrads labforce income
        / selection = rsquare adjrsq include=3; /* Can't group r1-r3 */
     /* Look at the selected model */
     model crimrate = r1 r2 r3 doctors hsgrads/ r clm;
proc means;
     var crimrate;
     class region;
```

=== Now part of the lst file. First descriptive stats & then stepwise ====

Descriptive Statistics

Variables	Sum	Mean	Uncorrected SS
INTERCEP	141	1	141
R1	35	0.2482269504	35
R2	51	0.3617021277	51
R3	28	0.1985815603	28
LANDAREA	363721	2579.5815603	2024868829
TOTPOP	132838	942.11347518	357271388
URBAN	5891.6	41.784397163	289671.56
OLDFOLKS	1384.7	9.8205673759	14489.35
DOCTORS	250719	1778.1489362	1715566309
HOSPBEDS	864913	6134.1347518	15583556605
HSGRADS	7689.7	54.536879433	428124.21
LABFORCE	60872.2	431.7177305	75116314.72
INCOME	914794	6487.9007092	19631090146
CRIMRATE	7877.2520489	55.867035808	469244.66354

Stepwise Procedure for Dependent Variable CRIMRATE

Step 1 Group region Entered R-square = 0.38251098 C(p) = 19.88763573

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	3	11156.29269099	3718.76423033	28.29	0.0001
Error	137	18009.64856591	131.45728880		
Total	140	29165.94125690			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob>F
INTERCEP	42.20579312	2.20653313	48095.88227487	365.87	0.0001
--- Group region ---			11156.29269099	28.29	0.0001
R1	10.57265646	2.93678583	1703.75977561	12.96	0.0004
R2	15.20634325	2.72880603	4082.14959995	31.05	0.0001
R3	27.88102632	3.09252189	10685.05147400	81.28	0.0001

Bounds on condition number: 1.843972, 15.60835

Step 2 Group doctors Entered R-square = 0.44043767 C(p) = 7.54523499

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	4	12845.77919373	3211.44479843	26.76	0.0001
Error	136	16320.16206317	120.00119164		
Total	140	29165.94125690			

```
                Parameter        Standard          Type II
Variable         Estimate           Error   Sum of Squares           F   Prob>F

INTERCEP      39.32895012      2.24328643   36884.23710890      307.37   0.0001
--- Group region   ---                      11506.12670020       31.96   0.0001
R1            11.49231021      2.81658784    1997.80749518       16.65   0.0001
R2            16.57355642      2.63253189    4756.30503712       39.64   0.0001
R3            28.28192558      2.95663002   10980.18212984       91.50   0.0001
--- Group doctors  ---                       1689.48650274       14.08   0.0003
DOCTORS        0.00116662      0.00031092    1689.48650274       14.08   0.0003

Bounds on condition number:     1.879989,     25.10794
-------------------------------------------------------------------------------

Step 3   Group hsgrads  Entered     R-square = 0.46380739   C(p) =  3.75899127

                DF         Sum of Squares      Mean Square           F   Prob>F

Regression       5         13527.37921525    2705.47584305       23.36   0.0001
Error          135         15638.56204165     115.84120031
Total          140         29165.94125690

                Parameter        Standard          Type II
Variable         Estimate           Error   Sum of Squares           F   Prob>F

INTERCEP      21.03850311      7.85586659     830.81536998        7.17   0.0083
--- Group region   ---                       8468.11094478       24.37   0.0001
R1             9.85744369      2.84822878    1387.52851458       11.98   0.0007
R2            17.10263868      2.59567994    5029.06219977       43.41   0.0001
R3            24.25213403      3.34642406    6084.16552423       52.52   0.0001
--- Group doctors  ---                       1533.87160813       13.24   0.0004
DOCTORS        0.00111436      0.00030624    1533.87160813       13.24   0.0004
--- Group hsgrads  ---                        681.60002152        5.88   0.0166
HSGRADS        0.35568719      0.14663409     681.60002152        5.88   0.0166

Bounds on condition number:     2.169283,     42.78862
-------------------------------------------------------------------------------

All groups of variables left in the model are significant at the 0.0500 level.
No other group of variables met the 0.0500 significance level for entry into
the model.

         Summary of Stepwise Procedure for Dependent Variable CRIMRATE

       Group            Number   Partial    Model
Step   Entered Removed      In      R**2     R**2        C(p)           F   Prob>F

   1   region                3    0.3825   0.3825    19.8876    28.2888   0.0000
   2   doctors               4    0.0579   0.4404     7.5452    14.0789   0.0003
   3   hsgrads               5    0.0234   0.4638     3.7590     5.8839   0.0166
```

======= Now R-Squared output ====

```
 N = 141     Regression Models for Dependent Variable: CRIMRATE

        R-square       Adj  Variables in Model
  In                   Rsq

     3  0.382511  0.368989  R1 R2 R3

NOTE: The above variables are included in all models to follow.

------------------------------------
     4  0.440438  0.423980  DOCTORS
     4  0.434824  0.418201  INCOME
     4  0.434316  0.417679  HOSPBEDS
     4  0.434258  0.417618  TOTPOP
     4  0.433118  0.416445  LABFORCE
     4  0.411216  0.393899  HSGRADS
     4  0.396925  0.379187  LANDAREA
     4  0.384960  0.366871  OLDFOLKS
     4  0.383894  0.365773  URBAN
---------------------------------
     5  0.463807  0.443948  DOCTORS HSGRADS
     5  0.460042  0.440043  TOTPOP HSGRADS
     5  0.459349  0.439325  HSGRADS INCOME
     5  0.459179  0.439149  HOSPBEDS HSGRADS
     5  0.457896  0.437818  HSGRADS LABFORCE
     5  0.449397  0.429005  LANDAREA DOCTORS
     5  0.442938  0.422307  LANDAREA INCOME
     5  0.442262  0.421605  LANDAREA HOSPBEDS
     5  0.442182  0.421522  OLDFOLKS DOCTORS
     5  0.441824  0.421151  DOCTORS LABFORCE
     5  0.441702  0.421024  TOTPOP DOCTORS
     5  0.441652  0.420972  DOCTORS INCOME
------------------------------------------
     6  0.475151  0.451650  LANDAREA DOCTORS HSGRADS
     6  0.469804  0.446064  LANDAREA HSGRADS INCOME
     6  0.469448  0.445692  LANDAREA HOSPBEDS HSGRADS
     6  0.469359  0.445599  LANDAREA TOTPOP HSGRADS
     6  0.467936  0.444112  OLDFOLKS DOCTORS HSGRADS
     6  0.467574  0.443734  LANDAREA HSGRADS LABFORCE
     6  0.464609  0.440636  DOCTORS HSGRADS LABFORCE
     6  0.464481  0.440503  DOCTORS HSGRADS INCOME
     6  0.464341  0.440356  DOCTORS HOSPBEDS HSGRADS
     6  0.464335  0.440350  TOTPOP OLDFOLKS HSGRADS
     6  0.464025  0.440026  TOTPOP DOCTORS HSGRADS
     6  0.463928  0.439925  URBAN DOCTORS HSGRADS
-------------------------------------------------
     7  0.478063  0.450593  LANDAREA OLDFOLKS DOCTORS HSGRADS
     7  0.477892  0.450413  LANDAREA DOCTORS HSGRADS LABFORCE
     7  0.477090  0.449568  LANDAREA TOTPOP DOCTORS HSGRADS
     7  0.476866  0.449332  LANDAREA DOCTORS HSGRADS INCOME
     7  0.476767  0.449228  LANDAREA DOCTORS HOSPBEDS HSGRADS
```

7	0.475692	0.448097	LANDAREA URBAN DOCTORS HSGRADS
7	0.473851	0.446159	LANDAREA HSGRADS LABFORCE INCOME
7	0.473056	0.445322	LANDAREA OLDFOLKS HSGRADS INCOME
7	0.472529	0.444768	LANDAREA TOTPOP OLDFOLKS HSGRADS
7	0.472412	0.444644	LANDAREA TOTPOP HSGRADS LABFORCE
7	0.472380	0.444610	LANDAREA OLDFOLKS HOSPBEDS HSGRADS
7	0.471032	0.443192	LANDAREA OLDFOLKS HSGRADS LABFORCE

. . . (Results for models with more than 7 IVs have been deleted) . . .

=========== Now a look at the model that was selected automatically ====

```
Model: MODEL3
Dependent Variable: CRIMRATE   Crime Rate: Serious crimes per thousand

                        Analysis of Variance

                            Sum of         Mean
      Source          DF       Squares       Square      F Value       Prob>F

      Model            5  13527.37922   2705.47584       23.355       0.0001
      Error          135  15638.56204    115.84120
      C Total        140  29165.94126

          Root MSE      10.76295     R-square       0.4638
          Dep Mean      55.86704     Adj R-sq       0.4439
          C.V.          19.26531

                         Parameter Estimates

                    Parameter      Standard    T for H0:
    Variable  DF     Estimate         Error   Parameter=0    Prob > |T|

    INTERCEP   1    21.038503    7.85586659         2.678        0.0083
    R1         1     9.857444    2.84822878         3.461        0.0007
    R2         1    17.102639    2.59567994         6.589        0.0001
    R3         1    24.252134    3.34642406         7.247        0.0001
    DOCTORS    1     0.001114    0.00030624         3.639        0.0004
    HSGRADS    1     0.355687    0.14663409         2.426        0.0166

                 Variable
    Variable  DF    Label

    INTERCEP   1  Intercept
    R1         1
    R2         1
    R3         1
    DOCTORS    1  Number active nonfederal physicians 1977
    HSGRADS    1  Percent of pop 25+ with 12+ trs schoolin
```

Obs	Dep Var CRIMRATE	Predict Value	Std Err Predict	Lower95% Mean	Upper95% Mean	Residual	Std Err Residual
1	.	42.4192	2.124	38.2192	46.6192	.	.
2	.	52.2766	1.837	48.6429	55.9103	.	.
3	.	59.5218	1.643	56.2728	62.7709	.	.
4	.	66.6713	2.386	61.9529	71.3898	.	.
5	75.5549	67.4161	7.410	52.7615	82.0706	8.1389	7.806
6	71.0870	84.4921	4.556	75.4817	93.5025	-13.4050	9.751
7	56.0299	64.9174	4.041	56.9256	72.9092	-8.8875	9.976
8	41.3229	49.8723	3.052	43.8361	55.9085	-8.5494	10.321
9	67.3835	56.5969	2.425	51.8014	61.3925	10.7866	10.486
10	80.1892	78.2758	2.834	72.6716	83.8801	1.9134	10.383

. . . (Rest of the list file omitted up to proc means output) . . .

REGION	N Obs	N	Mean	Std Dev	Minimum
Northeast	28	27	42.2057931	13.6756200	15.6902985
North central	36	35	52.7784496	8.7692392	31.8106061
South	52	51	57.4121364	12.0644156	25.5514706
West	29	28	70.0868194	10.9797293	53.7309091