Birth Weight Part 3

```
/* bweightread.sas: Just read the data */
options linesize=79 pagesize=500 noovp formdlim='-';
/* Watch out for huge page size if there are plots */
title 'Low Birth Weight Data';

proc format; /* Value labels used in data step below  */
     value lowfmt  0 = '2500 g +'  1 = 'Under 2500 g';
     value racefmt 1 = 'White'
                   2 = 'Black'
                   3 = 'Other';
     value ynfmt   0 = 'No'  1 = 'Yes';

data bigbaby;
     infile 'bweight.data' firstobs=2; /* Skip the first line that R uses */
     input id low age lwt race smoke ptl ht ui ftv bwt;
     if race = 2 then r2 = 1; else r2=0;
     if race = 3 then r3 = 1; else r3=0;
     label id    =  'Identification Code'
           low   =  'Low Birth Weight'
           lwt   =  'Weight at Last Period'
           smoke =  'Smoke during Pregnancy'
           ptl   =  'History of Premature Labour'
           ht    =  'History of Hypertension'
           ui    =  'Presence of Uterine Irritability'
           ftv   =  'Visits to Doctor During 1st trimester'
           bwt   =  'Birth Weight in Grams'
           r2    =  'Black vs White'
           r3    =  'Other vs White';
     if ptl > 1 then ptl = 1;   /* Recode ptl from # of times to Yes-No */
/******  Value labels defined above in proc format  ******/
format low lowfmt.;
format race racefmt.;
format ht ui smoke ptl ynfmt.;


/* bweight3.sas */
%include 'bweightread.sas';

proc logistic;
     title3 'Full model';
     model low (event='Under 2500 g')  = age lwt smoke ptl ht ui ftv r2 r3;
     /* Can also say event=last or event=first */
     race: test r2=r3=0;
     Black_vs_Other: test r2=r3;
     Weak3: test age=0, ui=0, ftv=0;

proc logistic;
     title3 'Let SAS make the dummy variables';
     class race;
     model low (event=last) = age lwt smoke ptl ht ui ftv race;
     race: test raceBlack=0, raceOther=0;

proc logistic;
     title3 'Indicator dummy variable coding with the class statement';
     class race /  param = ref; /* Default is last, and it's alphabetical */
     /* class race / order=internal param=ref ref=first; Does the same  */
     model low (event=last) = age lwt smoke ptl ht ui ftv race;
     race: test raceBlack=0, raceOther=0;
```

```
proc logistic;
     title3 'Automatic Variable Selection: Forward';
     /* Smallest Score p-value with p < slentry=0.05 */
     class race /  param = ref;
     model low (event='Under 2500 g') = age lwt smoke ptl ht ui ftv race
           / selection=forward;

proc logistic;
     title3 'Automatic Variable Selection: Forward with full details';
     class race /  param = ref;
     model low (event='Under 2500 g') = age lwt smoke ptl ht ui ftv race
           / selection=forward details;

proc logistic;
     title3 'Automatic Variable Selection: Backward';
     /* Biggest Wald p-value with p > slstay=0.05 */
     class race /  param = ref;
     model low (event='Under 2500 g') = age lwt smoke ptl ht ui ftv race
           / selection=backward details;

proc logistic;
     title3 'Automatic Variable Selection: Forward with Possible Removal';
     /* Add based on smallest score p-value  with p < slentry=0.05
        Remove based on biggest Wald p-value with p > slstay=0.05 */
     class race /  param = ref;
     model low (event='Under 2500 g') = age lwt smoke ptl ht ui ftv race
           / selection=stepwise details;

proc logistic;
     title3 'Automatic Variable Selection: Backward with Possible Re-entry';
     /* Add based on smallest score p-value  with p < slentry=0.05
        Remove based on biggest Wald p-value with p > slstay=0.05 */
     class race /  param = ref;
     model low (event='Under 2500 g') = age lwt smoke ptl ht ui ftv race
           / selection=stepwise start = 8 details;
```

Full model

The LOGISTIC Procedure

Model Information

Data Set	WORK.BIGBABY	
Response Variable	low	Low Birth Weight
Number of Response Levels	2	
Model	binary logit	
Optimization Technique	Fisher's scoring	

Number of Observations Read	189
Number of Observations Used	189

Response Profile

Ordered Value	low	Total Frequency
1	2500 g +	130
2	Under 2500 g	59

Probability modeled is low='Under 2500 g'.

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	236.672	216.750
SC	239.914	249.168
-2 Log L	234.672	196.750

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	37.9219	9	<.0001
Score	35.4005	9	<.0001
Wald	28.6172	9	0.0008

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	0.6445	1.2239	0.2773	0.5985
age	1	-0.0395	0.0383	1.0659	0.3019
lwt	1	-0.0151	0.00703	4.5942	0.0321
smoke	1	0.8595	0.4098	4.3975	0.0360
ptl	1	1.2185	0.4630	6.9256	0.0085
ht	1	1.8604	0.7082	6.9016	0.0086
ui	1	0.7193	0.4634	2.4091	0.1206
ftv	1	0.0509	0.1755	0.0842	0.7717
r2	1	1.2188	0.5332	5.2253	0.0223
r3	1	0.8194	0.4505	3.3089	0.0689

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
age	0.961	0.892	1.036
lwt	0.985	0.972	0.999
smoke	2.362	1.058	5.274
ptl	3.382	1.365	8.381
ht	6.426	1.604	25.750
ui	2.053	0.828	5.092
ftv	1.052	0.746	1.484
r2	3.383	1.190	9.620
r3	2.269	0.938	5.487

Association of Predicted Probabilities and Observed Responses

Percent Concordant	75.6	Somers' D	0.516
Percent Discordant	24.1	Gamma	0.517
Percent Tied	0.3	Tau-a	0.223
Pairs	7670	c	0.758

Linear Hypotheses Testing Results

Label	Wald Chi-Square	DF	Pr > ChiSq
race	6.2284	2	0.0444
Black_vs_Other	0.5343	1	0.4648
Weak3	3.6958	3	0.2962

Let SAS make the dummy variables

The LOGISTIC Procedure

Model Information

Data Set	WORK.BIGBABY	
Response Variable	low	Low Birth Weight
Number of Response Levels	2	
Model	binary logit	
Optimization Technique	Fisher's scoring	

Number of Observations Read	189
Number of Observations Used	189

Response Profile

Ordered Value	low	Total Frequency
1	2500 g +	130
2	Under 2500 g	59

Probability modeled is low='Under 2500 g'.

Class Level Information

Class	Value	Design Variables	
race	Black	1	0
	Other	0	1
	White	-1	-1

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	236.672	216.750
SC	239.914	249.168
-2 Log L	234.672	196.750

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	37.9219	9	<.0001
Score	35.4005	9	<.0001
Wald	28.6172	9	0.0008

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
age	1	1.0659	0.3019
lwt	1	4.5942	0.0321
smoke	1	4.3975	0.0360
ptl	1	6.9256	0.0085
ht	1	6.9016	0.0086
ui	1	2.4091	0.1206
ftv	1	0.0842	0.7717
race	2	6.2284	0.0444

Analysis of Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	1.3239	1.1751	1.2692	0.2599
age		1	-0.0395	0.0383	1.0659	0.3019
lwt		1	-0.0151	0.00703	4.5942	0.0321
smoke		1	0.8595	0.4098	4.3975	0.0360
ptl		1	1.2185	0.4630	6.9256	0.0085
ht		1	1.8604	0.7082	6.9016	0.0086
ui		1	0.7193	0.4634	2.4091	0.1206
ftv		1	0.0509	0.1755	0.0842	0.7717
race	Black	1	0.5394	0.3270	2.7200	0.0991
race	Other	1	0.1400	0.2826	0.2456	0.6202

Odds Ratio Estimates

Effect		Point Estimate	95% Wald Confidence Limits	
age		0.961	0.892	1.036
lwt		0.985	0.972	0.999
smoke		2.362	1.058	5.274
ptl		3.382	1.365	8.381
ht		6.426	1.604	25.750
ui		2.053	0.828	5.092
ftv		1.052	0.746	1.484
race	Black vs White	3.383	1.190	9.620
race	Other vs White	2.269	0.938	5.487

Association of Predicted Probabilities and Observed Responses

Percent Concordant	75.6	Somers' D	0.516
Percent Discordant	24.1	Gamma	0.517
Percent Tied	0.3	Tau-a	0.223
Pairs	7670	c	0.758

Linear Hypotheses Testing Results

Label	Wald Chi-Square	DF	Pr > ChiSq
race	6.2284	2	0.0444

Indicator dummy variable coding with the class statement

The LOGISTIC Procedure

Model Information

Data Set	WORK.BIGBABY	
Response Variable	low	Low Birth Weight
Number of Response Levels	2	
Model	binary logit	
Optimization Technique	Fisher's scoring	

Number of Observations Read	189
Number of Observations Used	189

Response Profile

Ordered Value	low	Total Frequency
1	2500 g +	130
2	Under 2500 g	59

Probability modeled is low='Under 2500 g'.

Class Level Information

Class	Value	Design Variables	
race	Black	1	0
	Other	0	1
	White	0	0

Skipping the rest of this output -- it's virtually the same as the one with r2 and r3.

Automatic Variable Selection: Forward

The LOGISTIC Procedure

Model Information

Data Set	WORK.BIGBABY	
Response Variable	low	Low Birth Weight
Number of Response Levels	2	
Model	binary logit	
Optimization Technique	Fisher's scoring	

Number of Observations Read	189
Number of Observations Used	189

Response Profile

Ordered Value	low	Total Frequency
1	2500 g +	130
2	Under 2500 g	59

Probability modeled is low='Under 2500 g'.

Forward Selection Procedure

Class Level Information

Class	Value	Design Variables	
race	Black	1	0
	Other	0	1
	White	0	0

Step 0. Intercept entered:

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

-2 Log L = 234.672

Residual Chi-Square Test

Chi-Square	DF	Pr > ChiSq
35.4005	9	<.0001

Step 1. Effect ptl entered:

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	236.672	225.898
SC	239.914	232.381
-2 Log L	234.672	221.898

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	12.7742	1	0.0004
Score	13.7590	1	0.0002
Wald	12.4546	1	0.0004

Residual Chi-Square Test

Chi-Square	DF	Pr > ChiSq
23.5411	8	0.0027

Step 2. Effect ht entered:

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	236.672	223.662
SC	239.914	233.387
-2 Log L	234.672	217.662

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	17.0101	2	0.0002
Score	18.0597	2	0.0001
Wald	15.9671	2	0.0003

Residual Chi-Square Test

Chi-Square	DF	Pr > ChiSq
19.4185	7	0.0070

Step 3. Effect lwt entered:

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	236.672	218.123
SC	239.914	231.090
-2 Log L	234.672	210.123

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	24.5486	3	<.0001
Score	24.2151	3	<.0001
Wald	20.1449	3	0.0002

Residual Chi-Square Test

Chi-Square	DF	Pr > ChiSq
13.0890	6	0.0416

NOTE: No (additional) effects met the 0.05 significance level for entry into the model.

Summary of Forward Selection

Step	Effect Entered	DF	Number In	Score Chi-Square	Pr > ChiSq
1	ptl	1	1	13.7590	0.0002
2	ht	1	2	4.6300	0.0314
3	lwt	1	3	6.8055	0.0091

Summary of Forward Selection

Step	Variable Label
1	History of Premature Labour
2	History of Hypertension
3	Weight at Last Period

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
lwt	1	6.4812	0.0109
ptl	1	10.7778	0.0010
ht	1	6.8984	0.0086

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	1.0171	0.8533	1.4209	0.2333
lwt	1	-0.0173	0.00679	6.4812	0.0109
ptl	1	1.4067	0.4285	10.7778	0.0010
ht	1	1.8939	0.7211	6.8984	0.0086

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
lwt	0.983	0.970	0.996
ptl	4.083	1.763	9.455
ht	6.645	1.617	27.308

Association of Predicted Probabilities and Observed Responses

Percent Concordant	71.1	Somers' D	0.438
Percent Discordant	27.3	Gamma	0.445
Percent Tied	1.6	Tau-a	0.189
Pairs	7670	c	0.719

Automatic Variable Selection: Forward with full details

The LOGISTIC Procedure

Model Information

Data Set	WORK.BIGBABY	
Response Variable	low	Low Birth Weight
Number of Response Levels	2	
Model	binary logit	
Optimization Technique	Fisher's scoring	

Number of Observations Read	189
Number of Observations Used	189

Response Profile

Ordered Value	low	Total Frequency
1	2500 g +	130
2	Under 2500 g	59

Probability modeled is low='Under 2500 g'.

Forward Selection Procedure

Class Level Information

Class	Value	Design Variables	
race	Black	1	0
	Other	0	1
	White	0	0

Step 0. Intercept entered:

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

-2 Log L = 234.672

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-0.7900	0.1570	25.3270	<.0001

Residual Chi-Square Test

Chi-Square	DF	Pr > ChiSq
35.4005	9	<.0001

Analysis of Effects Eligible for Entry

Effect	DF	Score Chi-Square	Pr > ChiSq
age	1	2.6737	0.1020
lwt	1	5.4382	0.0197
smoke	1	4.9237	0.0265
ptl	1	13.7590	0.0002
ht	1	4.3880	0.0362
ui	1	5.4008	0.0201
ftv	1	0.7492	0.3867
race	2	5.0048	0.0819

Step 1. Effect ptl entered:

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	236.672	225.898
SC	239.914	232.381
-2 Log L	234.672	221.898

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	12.7742	1	0.0004
Score	13.7590	1	0.0002
Wald	12.4546	1	0.0004

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
ptl	1	12.4546	0.0004

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-1.0571	0.1813	34.0025	<.0001
ptl	1	1.4626	0.4144	12.4546	0.0004

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
ptl	4.317	1.916	9.726

Association of Predicted Probabilities and Observed Responses

Percent Concordant	27.7	Somers' D	0.213
Percent Discordant	6.4	Gamma	0.624
Percent Tied	65.9	Tau-a	0.092
Pairs	7670	c	0.606

Residual Chi-Square Test

Chi-Square	DF	Pr > ChiSq
23.5411	8	0.0027

Analysis of Effects Eligible for Entry

Effect	DF	Score Chi-Square	Pr > ChiSq
age	1	4.3739	0.0365
lwt	1	4.0204	0.0450
smoke	1	2.6130	0.1060
ht	1	4.6300	0.0314
ui	1	2.9054	0.0883
ftv	1	0.7332	0.3918
race	2	4.8863	0.0869

Step 2. Effect ht entered:

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	236.672	223.662
SC	239.914	233.387
-2 Log L	234.672	217.662

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	17.0101	2	0.0002
Score	18.0597	2	0.0001
Wald	15.9671	2	0.0003

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
ptl	1	12.6616	0.0004
ht	1	4.2204	0.0399

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-1.1560	0.1911	36.5738	<.0001
ptl	1	1.4919	0.4193	12.6616	0.0004
ht	1	1.2879	0.6269	4.2204	0.0399

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
ptl	4.445	1.954	10.111
ht	3.625	1.061	12.387

Association of Predicted Probabilities and Observed Responses

Percent Concordant	35.4	Somers' D	0.266
Percent Discordant	8.8	Gamma	0.603
Percent Tied	55.9	Tau-a	0.115
Pairs	7670	c	0.633

Residual Chi-Square Test

Chi-Square	DF	Pr > ChiSq
19.4185	7	0.0070

Analysis of Effects Eligible for Entry

Effect	DF	Score Chi-Square	Pr > ChiSq
age	1	4.3229	0.0376
lwt	1	6.8055	0.0091
smoke	1	2.5368	0.1112
ui	1	3.9146	0.0479
ftv	1	0.5052	0.4772
race	2	4.4323	0.1090

Step 3. Effect lwt entered:

And so on. You get the idea.

Automatic Variable Selection: Backward

The LOGISTIC Procedure

Model Information

Data Set	WORK.BIGBABY	
Response Variable	low	Low Birth Weight
Number of Response Levels	2	
Model	binary logit	
Optimization Technique	Fisher's scoring	

Number of Observations Read	189
Number of Observations Used	189

Response Profile

Ordered Value	low	Total Frequency
1	2500 g +	130
2	Under 2500 g	59

Probability modeled is low='Under 2500 g'.

Backward Elimination Procedure

Class Level Information

Class	Value	Design Variables	
race	Black	1	0
	Other	0	1
	White	0	0

Step 0. The following effects were entered:

Intercept age lwt smoke ptl ht ui ftv race

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	236.672	216.750
SC	239.914	249.168
-2 Log L	234.672	196.750

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	37.9219	9	<.0001
Score	35.4005	9	<.0001
Wald	28.6172	9	0.0008

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
age	1	1.0659	0.3019
lwt	1	4.5942	0.0321
smoke	1	4.3975	0.0360
ptl	1	6.9256	0.0085
ht	1	6.9016	0.0086
ui	1	2.4091	0.1206
ftv	1	0.0842	0.7717
race	2	6.2284	0.0444

Analysis of Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	0.6445	1.2239	0.2773	0.5985
age		1	-0.0395	0.0383	1.0659	0.3019
lwt		1	-0.0151	0.00703	4.5942	0.0321
smoke		1	0.8595	0.4098	4.3975	0.0360
ptl		1	1.2185	0.4630	6.9256	0.0085
ht		1	1.8604	0.7082	6.9016	0.0086
ui		1	0.7193	0.4634	2.4091	0.1206
ftv		1	0.0509	0.1755	0.0842	0.7717
race	Black	1	1.2188	0.5332	5.2253	0.0223
race	Other	1	0.8194	0.4505	3.3089	0.0689

Odds Ratio Estimates

Effect		Point Estimate	95% Wald Confidence Limits	
age		0.961	0.892	1.036
lwt		0.985	0.972	0.999
smoke		2.362	1.058	5.274
ptl		3.382	1.365	8.381
ht		6.426	1.604	25.750
ui		2.053	0.828	5.092
ftv		1.052	0.746	1.484
race	Black vs White	3.383	1.190	9.620
race	Other vs White	2.269	0.938	5.487

Association of Predicted Probabilities and Observed Responses

Percent Concordant	75.6	Somers' D	0.516
Percent Discordant	24.1	Gamma	0.517
Percent Tied	0.3	Tau-a	0.223
Pairs	7670	c	0.758

Analysis of Effects Eligible for Removal

Effect	DF	Wald Chi-Square	Pr > ChiSq
age	1	1.0659	0.3019
lwt	1	4.5942	0.0321
smoke	1	4.3975	0.0360
ptl	1	6.9256	0.0085
ht	1	6.9016	0.0086
ui	1	2.4091	0.1206
ftv	1	0.0842	0.7717
race	2	6.2284	0.0444

Step 1. Effect ftv is removed:

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	236.672	214.834
SC	239.914	244.009
-2 Log L	234.672	196.834

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	37.8383	8	<.0001
Score	35.3799	8	<.0001
Wald	28.5843	8	0.0004

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
age	1	0.9968	0.3181
lwt	1	4.4851	0.0342
smoke	1	4.3020	0.0381
ptl	1	6.9626	0.0083
ht	1	6.8359	0.0089
ui	1	2.3578	0.1247
race	2	6.1575	0.0460

Analysis of Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	0.6369	1.2303	0.2680	0.6047
age		1	-0.0377	0.0378	0.9968	0.3181
lwt		1	-0.0149	0.00704	4.4851	0.0342
smoke		1	0.8464	0.4081	4.3020	0.0381
ptl		1	1.2218	0.4630	6.9626	0.0083
ht		1	1.8387	0.7033	6.8359	0.0089
ui		1	0.7111	0.4631	2.3578	0.1247
race	Black	1	1.2127	0.5325	5.1870	0.0228
race	Other	1	0.8041	0.4484	3.2153	0.0730

Odds Ratio Estimates

Effect		Point Estimate	95% Wald Confidence Limits	
age		0.963	0.894	1.037
lwt		0.985	0.972	0.999
smoke		2.331	1.048	5.187
ptl		3.393	1.369	8.409
ht		6.288	1.585	24.954
ui		2.036	0.822	5.047
race	Black vs White	3.363	1.184	9.549
race	Other vs White	2.235	0.928	5.382

Association of Predicted Probabilities and Observed Responses

Percent Concordant	75.6	Somers' D	0.515
Percent Discordant	24.1	Gamma	0.517
Percent Tied	0.3	Tau-a	0.222
Pairs	7670	c	0.758

Residual Chi-Square Test

Chi-Square	DF	Pr > ChiSq
0.0842	1	0.7717

Analysis of Effects Eligible for Removal

Effect	DF	Wald Chi-Square	Pr > ChiSq
age	1	0.9968	0.3181
lwt	1	4.4851	0.0342
smoke	1	4.3020	0.0381
ptl	1	6.9626	0.0083
ht	1	6.8359	0.0089
ui	1	2.3578	0.1247
race	2	6.1575	0.0460

Step 2. Effect age is removed:

And so on. Skipping a lot of output, ...

Summary of Backward Elimination

Step	Effect Removed	DF	Number In	Wald Chi-Square	Pr > ChiSq
1	ftv	1	7	0.0842	0.7717
2	age	1	6	0.9968	0.3181
3	ui	1	5	2.6767	0.1018

Summary of Backward Elimination

Step	Variable Label
1	Visits to Doctor During 1st trimester
2	
3	Presence of Uterine Irritability

Automatic Variable Selection: Forward with Possible Removal

The LOGISTIC Procedure

Model Information

Data Set	WORK.BIGBABY	
Response Variable	low	Low Birth Weight
Number of Response Levels	2	
Model	binary logit	
Optimization Technique	Fisher's scoring	

Number of Observations Read	189
Number of Observations Used	189

Response Profile

Ordered Value	low	Total Frequency
1	2500 g +	130
2	Under 2500 g	59

Probability modeled is low='Under 2500 g'.

Stepwise Selection Procedure

Class Level Information

Class	Value	Design Variables	
race	Black	1	0
	Other	0	1
	White	0	0

Step 0. Intercept entered:

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

-2 Log L = 234.672

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-0.7900	0.1570	25.3270	<.0001

Residual Chi-Square Test

Chi-Square	DF	Pr > ChiSq
35.4005	9	<.0001

Analysis of Effects Eligible for Entry

Effect	DF	Score Chi-Square	Pr > ChiSq
age	1	2.6737	0.1020
lwt	1	5.4382	0.0197
smoke	1	4.9237	0.0265
ptl	1	13.7590	0.0002
ht	1	4.3880	0.0362
ui	1	5.4008	0.0201
ftv	1	0.7492	0.3867
race	2	5.0048	0.0819

Step 1. Effect ptl entered:

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	236.672	225.898
SC	239.914	232.381
-2 Log L	234.672	221.898

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	12.7742	1	0.0004
Score	13.7590	1	0.0002
Wald	12.4546	1	0.0004

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
ptl	1	12.4546	0.0004

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-1.0571	0.1813	34.0025	<.0001
ptl	1	1.4626	0.4144	12.4546	0.0004

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
ptl	4.317	1.916	9.726

Association of Predicted Probabilities and Observed Responses

Percent Concordant	27.7	Somers' D	0.213
Percent Discordant	6.4	Gamma	0.624
Percent Tied	65.9	Tau-a	0.092
Pairs	7670	c	0.606

Residual Chi-Square Test

Chi-Square	DF	Pr > ChiSq
23.5411	8	0.0027

Analysis of Effects Eligible for Removal

Effect	DF	Wald Chi-Square	Pr > ChiSq
ptl	1	12.4546	0.0004

NOTE: No effects for the model in Step 1 are removed.

Analysis of Effects Eligible for Entry

Effect	DF	Score Chi-Square	Pr > ChiSq
age	1	4.3739	0.0365
lwt	1	4.0204	0.0450
smoke	1	2.6130	0.1060
ht	1	4.6300	0.0314
ui	1	2.9054	0.0883
ftv	1	0.7332	0.3918
race	2	4.8863	0.0869

Step 2. Effect ht entered:

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	236.672	223.662
SC	239.914	233.387
-2 Log L	234.672	217.662

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	17.0101	2	0.0002
Score	18.0597	2	0.0001
Wald	15.9671	2	0.0003

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
ptl	1	12.6616	0.0004
ht	1	4.2204	0.0399

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-1.1560	0.1911	36.5738	<.0001
ptl	1	1.4919	0.4193	12.6616	0.0004
ht	1	1.2879	0.6269	4.2204	0.0399

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
ptl	4.445	1.954	10.111
ht	3.625	1.061	12.387

Association of Predicted Probabilities and Observed Responses

Percent Concordant	35.4	Somers' D	0.266
Percent Discordant	8.8	Gamma	0.603
Percent Tied	55.9	Tau-a	0.115
Pairs	7670	c	0.633

Residual Chi-Square Test

Chi-Square	DF	Pr > ChiSq
19.4185	7	0.0070

Analysis of Effects Eligible for Removal

Effect	DF	Wald Chi-Square	Pr > ChiSq
ptl	1	12.6616	0.0004
ht	1	4.2204	0.0399

NOTE: No effects for the model in Step 2 are removed.

Analysis of Effects Eligible for Entry

Effect	DF	Score Chi-Square	Pr > ChiSq
age	1	4.3229	0.0376
lwt	1	6.8055	0.0091
smoke	1	2.5368	0.1112
ui	1	3.9146	0.0479
ftv	1	0.5052	0.4772
race	2	4.4323	0.1090

Step 3. Effect lwt entered:

And so on. Backward with Possible Re-entry is a lot like this.