

SAS Output for Problem 1

11-variable model

9-variable model

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	2089.901	163.726
SC	2104.105	334.172
-2 Log L	2083.901	91.726

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	1992.1747	33	<.0001
Score	1492.7360	33	<.0001
Wald	63.6519	33	0.0011

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
be	3	19.8339	0.0002
been	3	7.5449	0.0564
had	3	4.2273	0.2379
it	3	14.9937	0.0018
may	3	0.3498	0.9504
not	3	7.1483	0.0673
on	3	8.7828	0.0323
the	3	23.3225	<.0001
upon	3	14.5122	0.0023
was	3	15.3851	0.0015
which	3	12.5537	0.0057

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	2089.901	158.539
SC	2104.105	300.577
-2 Log L	2083.901	98.539

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	1985.3620	27	<.0001
Score	1485.8118	27	<.0001
Wald	68.1112	27	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
be	3	24.4315	<.0001
been	3	11.3495	0.0100
it	3	17.4911	0.0006
not	3	8.0324	0.0453
on	3	11.1929	0.0107
the	3	27.0712	<.0001
upon	3	18.0547	0.0004
was	3	24.0093	<.0001
which	3	14.8567	0.0019

Model with one predictor:

Analysis of Maximum Likelihood Estimates						
Parameter	Author	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	Austen	1	-0.9229	0.4024	5.2608	0.0218
Intercept	London	1	-11.4740	0.8850	168.0818	<.0001
Intercept	Milton	1	-3.1494	0.6580	22.9100	<.0001
the	Austen	1	0.0263	0.00682	14.8400	0.0001
the	London	1	0.1552	0.0116	179.9954	<.0001
the	Milton	1	0.0339	0.0105	10.3978	0.0013

SAS Output for Problem 2

The LOGISTIC Procedure

Model Information	
Data Set	WORK.DEPRESS
Response Variable	depress
Number of Response Levels	2
Frequency Variable	count
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	8
Number of Observations Used	8
Sum of Frequencies Read	744
Sum of Frequencies Used	744

Response Profile		
Ordered Value	depress	Total Frequency
1	yes	283
2	no	481

Probability modeled is depress='yes'.

Class Level Information		
Class	Value	Design Variables
educ	low	0
	hig	1
gender	female	1
	male	0

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

Deviance and Pearson Goodness-of-Fit Statistics				
Criterion	Value	DF	Value/DF	Pr > ChiSq
Deviance	0.0000	0	.	.
Pearson	0.0000	0	.	.

Number of unique profiles: 4

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	968.580	944.903
SC	973.192	963.352
-2 Log L	968.580	936.903

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	29.6763	3	<.0001
Score	28.3278	3	<.0001
Wald	27.2328	3	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
educ	1	4.3970	0.0360
gender	1	2.7709	0.0960
educ*gender	1	1.4902	0.2222

Analysis of Maximum Likelihood Estimates							
Parameter			DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept			1	-0.6931	0.2500	7.6872	0.0056
educ	hig		1	-0.6381	0.3043	4.3970	0.0360
gender	female		1	0.4818	0.2895	2.7709	0.0960
educ*gender	hig	female	1	0.4380	0.3588	1.4902	0.2222

The LOGISTIC Procedure

Model Information	
Data Set	WORK.DEPRESS
Response Variable	depress
Number of Response Levels	2
Frequency Variable	count
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	8
Number of Observations Used	8
Sum of Frequencies Read	744
Sum of Frequencies Used	744

Response Profile		
Ordered Value	depress	Total Frequency
1	yes	263
2	no	481

Probability modeled is depress='yes'.

Class Level Information		
Class	Value	Design Variables
educ	low	0
	hig	1
gender	female	1
	male	0

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

Deviance and Pearson Goodness-of-Fit Statistics				
Criterion	Value	DF	Value/DF	Pr > ChiSq
Deviance	1.4780	1	1.4780	0.2241
Pearson	1.4948	1	1.4948	0.2215

Number of unique profiles: 4

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	968.580	944.381
SC	973.192	958.218
-2 Log L	966.580	938.381

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	28.1983	2	<.0001
Score	27.4248	2	<.0001
Wald	26.6726	2	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
educ	1	3.9297	0.0474
gender	1	20.3695	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	-0.9115	0.1820	25.0878	<.0001
educ	hig	1	-0.3215	0.1622	3.9297	0.0474
gender	female	1	0.7714	0.1709	20.3695	<.0001

Output for Problem 3

Model A

The LOGISTIC Procedure

Model Information	
Data Set	WORK.CHILDREN
Response Variable	y
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	1761
Number of Observations Used	1761

Response Profile		
Ordered Value	y	Total Frequency
1	1	1363
2	0	398

Probability modeled is y=1.

Class Level Information						
Class	Value	Design Variables				
god	1	1	0	0	0	0
	2	0	1	0	0	0
	3	0	0	1	0	0
	4	0	0	0	1	0
	5	0	0	0	0	1
	6	-1	-1	-1	-1	-1

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

Deviance and Pearson Goodness-of-Fit Statistics				
Criterion	Value	DF	Value/DF	Pr > ChiSq
Deviance	1142.0681	987	1.1571	0.0004
Pearson	1114.9946	987	1.1297	0.0027

Number of unique profiles: 997

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	1884.183	1769.965
SC	1889.657	1824.701
-2 Log L	1882.183	1749.965

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	132.2186	9	<.0001
Score	135.6773	9	<.0001
Wald	119.8480	9	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
age	1	11.5405	0.0007
dur	1	58.3069	<.0001
nation	1	1.3782	0.2404
god	5	19.1337	0.0018
univ	1	21.4338	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	3.1094	0.4279	52.7937	<.0001
age		1	0.0135	0.00398	11.5405	0.0007
dur		1	-0.2524	0.0331	58.3069	<.0001
nation		1	0.5270	0.4489	1.3782	0.2404
god	1	1	0.3859	0.1619	5.6801	0.0172
god	2	1	0.1016	0.1115	0.8301	0.3622
god	3	1	-0.3478	0.1294	7.2200	0.0072
god	4	1	-0.2484	0.1360	3.3355	0.0678
god	5	1	0.2922	0.1390	4.4182	0.0356
univ		1	1.6699	0.3607	21.4338	<.0001

Model B

The LOGISTIC Procedure

Model Information	
Data Set	WORK.CHILDREN
Response Variable	y
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	1761
Number of Observations Used	1761

Response Profile		
Ordered Value	y	Total Frequency
1	1	1363
2	0	398

Probability modeled is y=1.

Class Level Information						
Class	Value	Design Variables				
god	1	1	0	0	0	0
	2	0	1	0	0	0
	3	0	0	1	0	0
	4	0	0	0	1	0
	5	0	0	0	0	1
	6	-1	-1	-1	-1	-1

Deviance and Pearson Goodness-of-Fit Statistics				
Criterion	Value	DF	Value/DF	Pr > ChiSq
Deviance	943.4165	983	0.9597	0.8132
Pearson	961.9962	983	0.9786	0.6780

Number of unique profiles: 997

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	1884.183	1579.313
SC	1889.657	1655.944
-2 Log L	1882.183	1551.313

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	330.8701	13	<.0001
Score	362.7462	13	<.0001
Wald	235.1667	13	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
age	1	16.7785	<.0001
age2	1	10.7504	0.0010
age3	1	50.1637	<.0001
age4	1	13.0763	0.0003
dur	1	17.8459	<.0001
dur2	1	5.4364	0.0197
nation	1	4.9784	0.0257
god	5	15.9104	0.0071
univ	1	12.9892	0.0003

ML estimates omitted here.

Partition for the Hosmer and Lemeshow Test					
Group	Total	y = 1		y = 0	
		Observed	Expected	Observed	Expected
1	176	49	48.75	127	127.25
2	176	115	111.37	61	64.63
3	177	125	133.34	52	43.66
4	176	144	139.76	32	36.24
5	176	147	145.84	29	30.16
6	176	156	149.97	20	26.03
7	177	154	154.03	23	22.97
8	177	154	157.25	23	19.75
9	177	155	160.86	22	16.14
10	173	164	161.84	9	11.16

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
8.1441	8	0.4195