SAS Output for Problem 1

Model Information	
Data Set	WORK.LABOR4
Response Variable	y
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	753
Number of Observations Used	753

Response Profile		
Ordered Value	y	Total Frequency
1	1	428
2	0	325

Probability modeled is y=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	905.2659	745	1.2151	<.0001
Pearson	751.8004	745	1.0091	0.4235

Number of unique profiles: 753

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	1031.746	921.266
SC	1036.370	958.258
-2 Log L	1029.746	905.266

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	124.4805	7	<.0001
Score	113.1807	7	<.0001
Wald	94.9727	7	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	3.1819	0.6444	24.3842	<.0001
k5	1	-1.4628	0.1970	55.1388	<.0001
k618	1	-0.0646	0.0680	0.9014	0.3424
age	1	-0.0629	0.0128	24.1865	<.0001
wc	1	0.8072	0.2300	12.3200	0.0004
hc	1	0.1117	0.2060	0.2940	0.5877
lwg	1	0.6047	0.1508	16.0738	<.0001
inc	1	-0.0344	0.00821	17.6080	<.0001

Partition for the Hosmer and Lemeshow Test					
		y = 1		y = 0	
Group	Total	Observed	Expected	Observed	Expected
1	75	27	15.12	48	59.88
2	75	19	27.00	56	48.00
3	75	25	32.90	50	42.10
4	75	31	37.18	44	37.82
5	75	42	41.22	33	33.78
6	75	50	45.17	25	29.83
7	75	50	49.58	25	25.42
8	75	55	53.90	20	21.10
9	75	57	58.52	18	16.48
10	78	72	67.41	6	10.59

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
24.7058	8	0.0017

SAS Output for Problem 2

Model Information	
Data Set	WORK.NEWPUB2
Response Variable	pubs
Number of Response Levels	3
Model	cumulative logit
Optimization Technique	Fisher's scoring

Number of Observations Read	915
Number of Observations Used	915

Response Profile		
Ordered Value	pubs	Total Frequency
1	0	275
2	1	246
3	2	394

Probabilities modeled are cumulated over the lower Ordered Values.

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

Score Test for the Proportional Odds Assumption		
Chi-Square	DF	Pr > ChiSq
5.7017	5	0.3363

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	1975.419	1908.383
SC	1985.057	1942.115
-2 Log L	1971.419	1894.383

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	1975.419	1908.383
SC	1985.057	1942.115
-2 Log L	1971.419	1894.383

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	77.0364	5	<.0001
Score	70.3467	5	<.0001
Wald	63.6918	5	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	0	1	-0.1593	0.2509	0.4033	0.5254
Intercept	1	1	1.0400	0.2532	16.8732	<.0001
fem		1	0.2138	0.1329	2.5851	0.1079
mar		1	-0.2998	0.1509	3.9481	0.0469
kid5		1	0.2518	0.0946	7.0803	0.0078
ment		1	-0.0572	0.00857	44.5885	<.0001
phd		1	-0.0885	0.0666	1.7676	0.1837

SAS Output for Problem 2 (continued)

Model Information	
Data Set	WORK.NEWPUB2
Response Variable	pubs
Number of Response Levels	3
Model	generalized logit
Optimization Technique	Newton-Raphson

Number of Observations Read	915
Number of Observations Used	915

Response Profile		
Ordered Value	pubs	Total Frequency
1	2	394
2	1	246
3	0	275

Logits modeled use pubs=0 as the reference category.

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

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	1975.419	1910.263
SC	1985.057	1968.090
-2 Log L	1971.419	1886.263

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	85.1560	10	<.0001
Score	72.2969	10	<.0001
Wald	64.7448	10	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
fem	2	2.5280	0.2825
mar	2	4.3792	0.1120
kid5	2	7.5178	0.0233
ment	2	45.6700	<.0001
phd	2	3.1551	0.2065

Analysis of Maximum Likelihood Estimates						
Parameter	pubs	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	2	1	-0.5792	0.3288	3.1027	0.0782
Intercept	1	1	-0.2496	0.3498	0.5093	0.4755
fem	2	1	-0.2633	0.1744	2.2781	0.1312
fem	1	1	-0.2349	0.1896	1.5346	0.2154
mar	2	1	0.4121	0.1982	4.3221	0.0376
mar	1	1	0.2009	0.2153	0.8701	0.3509
kid5	2	1	-0.3384	0.1238	7.4723	0.0063
kid5	1	1	-0.2103	0.1325	2.5191	0.1125
ment	2	1	0.0898	0.0135	44.1513	<.0001
ment	1	1	0.0635	0.0144	19.5222	<.0001
phd	2	1	0.0861	0.0875	0.9690	0.3249
phd	1	1	-0.0666	0.0945	0.4963	0.4811

SAS Output for Problem 3

The LOGISTIC Procedure

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

Number of Observations Read	12
Number of Observations Used	12
Sum of Frequencies Read	3688
Sum of Frequencies Used	3688

Response Profile		
Ordered Value	accept	Total Frequency
1	yes	1685
2	no	2003

Probability modeled is accept='yes'.

Class Level Information			
Class	Value	Design Variables	
gender	fema	1	
	male	0	
program	cosmetol	1	0
	plumbing	0	1
	welding	0	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	9.0862	2	4.5431	0.0106
Pearson	9.0146	2	4.5073	0.0110

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	5087.200	3833.054
SC	5093.413	3857.906
-2 Log L	5085.200	3825.054

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	1260.1454	3	<.0001
Score	1078.4023	3	<.0001
Wald	663.8744	3	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
gender	1	23.1760	<.0001
program	2	587.4449	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	0.5184	0.0669	60.0404	<.0001
gender	fema	1	0.6612	0.1374	23.1760	<.0001
program	cosmetol	1	-3.5477	0.1581	503.2958	<.0001
program	plumbing	1	0.00653	0.0858	0.0058	0.9394

Partition for the Hosmer and Lemeshow Test					
		accept = yes		accept = no	
Group	Total	Observed	Expected	Observed	Expected
1	618	36	28.50	582	589.50
2	555	40	47.53	515	507.47
3	928	585	581.64	343	346.36
4	1367	848	858.88	519	508.12
5	220	176	168.48	44	51.52

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
5.2278	3	0.1559

SAS Output for Problem 3 (continued)

The LOGISTIC Procedure

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

Number of Observations Read	12
Number of Observations Used	12
Sum of Frequencies Read	3688
Sum of Frequencies Used	3688

Response Profile		
Ordered Value	accept	Total Frequency
1	yes	1685
2	no	2003

Probability modeled is accept='yes'.

Class Level Information			
Class	Value	Design Variables	
gender	fema	1	
	male	0	
program	cosmetol	1	0
	plumbing	0	1
	welding	0	0

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: 6

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	5087.200	3827.968
SC	5093.413	3865.245
-2 Log L	5085.200	3815.968

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	1269.2316	5	<.0001
Score	1093.8849	5	<.0001
Wald	685.3335	5	<.0001

Joint Tests			
Effect	DF	Wald Chi-Square	Pr > ChiSq
gender	1	0.4645	0.4955
program	2	345.7499	<.0001
gender*program	2	8.8606	0.0119

Analysis of Maximum Likelihood Estimates							
Parameter			DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept			1	0.5339	0.0680	61.6299	<.0001
gender	fema		1	0.2334	0.3424	0.4645	0.4955
program	cosmetol		1	-3.3162	0.1847	322.4549	<.0001
program	plumbing		1	-0.0429	0.0879	0.2381	0.6256
gender*program	fema	cosmetol	1	-0.00617	0.4168	0.0002	0.9882
gender*program	fema	plumbing	1	0.8389	0.3992	4.4152	0.0356