LOGISTIC REGRESSION

COM 631/731

4/16/16 (v.2) Violet Cox

I. MODEL

BLOCK 1

Community Connections

Q1: Which best describes where you live? (six-point rural-ness measure)

Q2: How long lived there

Q9: How significant your community is to you

Q39: Collected neighbor's mail

BLOCK 2

Sense of Community

Q 27: Feel part of community

Q28: Identify strongly with community

Q29: Enjoy living in community

O30: Feel safe and secure in community

Community Involvement

Q52: Did you work with others in community to solve problem?

(0=no, 1=yes)

II. <u>RUNNING SPSS</u>

Running the Logistic Regression

Analyze — Regression — Binary Logistic

DEPENDENT: Insert Dependent variable

COVARIATES: Insert independent variables from Block 1

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	Name	Туре	Width	Decimals		Label	Í	Values	Missing	Columns	Align	Measure	Role
1	ID	Numeric	3	0			N	lone	None	8	I Right	Scale Scale	🦒 Input
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4	q1	Numeric	1	0	Q1:Where live		(1, 1=centra	7 - 99, 0	8	ill Right	P Scale	🦒 Input
5	q2	Numeric	1	0	Q2:Time liver	aression		-			and the second s		Input
6	q3	String	255	0	Q3:Deciding			and a second	The second se	-	1000	- Second	Input
7	q4	Numeric	2	0	Q4:Commun			Dependent				Categorical	Input
8	q5	Numeric	2	0	Q5:Neighbor Ø Q26:Fee	l lost if moved from neighborhoo	- M	🔗 Q52:W	orked w/others	on communit	y problems [q52]	Save	Input
9	q6	Numeric	2	0	Q6:Value fan Q27:Fee	I part of community [q27]	Bloc	x 1 of 1				Quite	Input
10	q7	Numeric	2	0	Q7:Value wo 29:Enj	oy living in neighborhood [g29]	Pre				Next	Opeons	Input
11	q8	Numeric	2	0	Q8:Value frie 🛷 Q30:Fee	I safe, secure in neighborhood [Covaria	les:			Style	Input
12	q9	Numeric	2	0	Q9:Value nei 🧳 Q31:Put	lic officials don't care what I think		01				1	Input
13	q10	Numeric	2	0	QI0:Value rel Ø Q32:Hav	e little influence over local gov [q		q2					Input
14	q11	Numeric	2	0	Q11:Value el 233:Dol 2034:No	neigh homes visited (g34)		q9					Input
15	q12	Numeric	2	0	Q12:Value b Q35:No.	neighbors know (q35)		q39					Input
16	q13	Numeric	2	0	QI3:Value ho 🔗 Q36:% fi	iends living in same community	20	02					Input
17	q14	Numeric	2	0	Q14:Value or 🖉 Q37:Hel	ped neighbor around house [q37]							Input
18	q15	Numeric	2	0	Q15:Value p Q38:Len	t,borrowed neighbor (q38)	Mett	od: Enter			+		Input
19	q16	Numeric	2	0	Q16:Often ta	eichbors from same ethnic racia		Selection V	aria <u>b</u> le:				Input
20	q17	Numeric	2	0	Q17.Talk w/r 🖉 Q41:Bel	ong civic groups (q41)					Rule		Input
21	q18	Numeric	2	0	Q18:Greet pt	no religious oras (ad:2)							Input
22	q19	Numeric	2	0	Q19:Hear ne	0	K Pa	iste Reset	Cancel	Help			Input
23	q20	Numeric	2	0	Q20 Hear ne		_			_			Input
24	q21	Numeric	2	0	Q21:Comfort voicing compla	ints public meeting	(0, 0=Compl	. 11 - 99	8	殭 Right	Scale 🖉	🦒 Input
25	q22	Numeric	2	0	Q22:People afraid to speak	qu	{	0, 0=Compl	. 11 - 99	8	I Right	I Scale	S Input
26	q23	Numeric	2	0	Q23:Public officials receptive	1	(0, 0=Compl	. 11 - 99	8	ill Right	P Scale	🦒 Input
27	q24	Numeric	2	0	Q24:Talk pol w/neighbors ele	ection time	(0, 0=Compl	. 11 - 99	8	殭 Right	Scale 🖉	🦒 Input
28	q25	Numeric	2	0	Q25:Talk pol w/family, friend	s election time	{	0, 0=Compl	. 11 - 99	8	I Right	I Scale	🦒 Input
29	q26	Numeric	2	0	Q26 Feel lost if moved from	neighborhood	(0, 0=Compl	. 11 - 99	8	Right	P Scale	🦒 Input
30	q27	Numeric	2	0	Q27:Feel part of community		(0, 0=Compl	. 11 - 99	8	I Right	Scale 🖉	🦒 Input
31	q28	Numeric	2	0	Q28:Feel strong ID w/comm	unity	{	0, 0=Compl	. 11 - 99	8	I Right	I Scale	🦒 Input
32	q29	Numeric	2	0	Q29:Enjoy living in neighborh	bood	(0, 0=Compl	11 - 99	8	Right	P Scale	🦒 Input
33	q30	Numeric	2	0	Q30:Feel safe, secure in nei	ghborhood	(0, 0=Compl	. 11 - 99	8	Right	Scale 🖉	🦒 Input
34	q31	Numeric	2	0	Q31:Public officials don't car	e what I think	(0, 0=Compl	. 11 - 99	8	Te Right	🔗 Scale	🦒 Input
35	q32	Numeric	2	0	Q32:Have little influence ove	r local gov	(0, 0=Compl	. 11 - 99	8	Right Right	🛷 Scale	🍾 Input
36	q33	Numeric	2	0	Q33:Don't have say about w	hat gov does	(0, 0=Compl	11 - 99	8	Right	P Scale	🦒 Input
37	q34	Numeric	2	0	Q34:No.neigh homes visited		(0, 0=None}	11 - 99	8	🖷 Right	🔗 Scale	🦒 Input
38	q35	Numeric	2	0	Q35:No.neighbors know		(0, 0=None}	11 - 99	8	I Right	🛷 Scale	🍾 Input
39	a36	Numeric	1	0	Q36 % friends living in same	community	1	0 0=none3	6 - 9	8	Right	& Scale	🔪 Input
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4	q1	Numeric	1	0	Q1:Where live			{1, 1=centra.	7 - 99, 0	8	🚟 Right	🛷 Scale	🦒 Input
5	q2	Numeric	1	0	Q2:Time lived	Logistic Regression		-	-		and the second s		Input
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8	q5	Numeric	2	0	Q5:Neighbor	Q26:Feel lost if moved from n	eighborhoo 🖆	🔶 🔗 Q52:V	Vorked w/others	on community	problems (q52)	Save	Input
9	q6	Numeric	2	0	Q6:Value fan	Q27:Feel part of community [c 2029:Feel strong ID w/community]	[27] nity (a29]	Block 2 of 2				<u>O</u> utions	linput
10	q7	Numeric	2	0	Q7:Value wo	Q29:Enjoy living in neighborh	ood [q29]	Previous			Next	Options.	linput
11	q8	Numeric	2	0	Q8:Value frie	🔗 Q30:Feel safe, secure in neig	hborhood [Covaria	ates:			Style	lnput
12	dð	Numeric	2	0	Q9:Value nei	Q31:Public officials don't care	what I think	a27					Input
13	q10	Numeric	2	0	QI0:Value rel	Q32:Have little influence over	local gov [q	q28					l Input
14	q11	Numeric	2	0	Q11:Value et	Q34:No.neigh homes visited	a gov ades a 341	q 29					i Input
15	q12	Numeric	2	0	Q12:Value b	🔗 Q35:No.neighbors know [q35		q30					l Input
16	q13	Numeric	2	0	QI3:Value ho	Q36:% friends living in same	community	· <u>u</u> u.					Input
17	q14	Numeric	2	0	Q14:Value of	Q37:Helped neighbor around Q37:Helped neighbor around	house (q37)						Input
18	q15	Numeric	2	0	Q15:Value p	Q38:Leni,borrowed neighbor Ø Q39:Collected neigh mail [g3]	[q38] 91	Method: Enter					Input
19	q16	Numeric	2	0	Q16:Often ta	Q40:% neighbors from same	ethnic,racia	Selection \	Varia <u>b</u> le:				Input
20	q17	Numeric	2	0	Q17:Talk w/r	🗳 Q41:Belong civic groups [q41		*			Rul	e	Input
21	q18	Numeric	2	0	Q18:Greet pa	A 042 Reland religious ards for	191						Input
22	q19	Numeric	2	0	Q19:Hear ne		ОК	Paste Rese	et Cancel H	lelp			Input
23	q20	Numeric	2	0	Q20:Hear nell			(0.0.0.)		0		Ac	Input
24	q21	Numeric	2	0	Q21:Comfort v	bicing complaints public meeting		{0, 0=Compl.	11 - 99	8	a Right	Scale	S Input
25	q22	Numeric	2	0	Q22:People at	aid to speak up		{0, 0=Compl.	11 - 99	ö	E Right	Scale	S Input
26	q23	Numeric	2	0	Q23:Public om	ciais receptive		{0, 0=Compi.	11 - 99	8	Right		s input
2/	q24	Numeric	2	0	Q24: Talk pol w	neignbors election time		{0, 0=Compl.	11 - 99	ŏ	Right Right	Scale	S Input
28	q25	Numeric	2	0	Q25:Talk pol w	family, friends election time		{0, 0=Compi.	11 - 99	0	T Disk	Scale	s input
29	420 a27	Numeric	2	0	Q27:Feel lost	n moved from neighborhood		{0, 0=Compl.	11 - 39	0	E Right	Scale	s input
30	421 a29	Numeric	2	0	O29:Eeel strop	a ID w/community		{0, 0=Compl.	11 00	0	E Diaht	Scale	> Input
32	420 a20	Numeric	2	0	O20:Enjoy livin	g in neighborhood		to, 0=Compl.	11 00	8	Pight	Scale	 Input
32	42J a30	Numeric	2	0	O30:Eeel sofo	secure in neighborhood		{0, 0=Compl.	11 - 99	8	E Right	Scale	> Input
34	430 a31	Numeric	2	0	Q31:Public offi	cials don't care what I think		(0, 0=Compl.	11 - 99	8	= Right	Scale	> Input
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36	40- a33	Numeric	2	0	Q33:Don't have	sav about what nov does		(0, 0=Compl.	11 - 99	8	= Right	A Scale	> Input
37	n34	Numeric	2	0	Q34:No neigh	homes visited		{0_0=None1	11 - 99	8	= Right	Scale	> Input
38	a35	Numeric	2	0	Q35:No neight	ors know		{0 0=None}	11 - 99	8	I Right	Scale	> Input
39	a36	Numeric	1	0	Q36 % friends	living in same community		{0_0=none}	6 - 9	8	I Right	Scale	> Input
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COVARIATES: Insert independent variables from Block 2

OPTIONS: Select Classification Plots, Hosmer-Lemeshow, and CI for Exp (B) at 95%.

CLICK: Continue

CLICK: OK

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q44	Numeric	10 Q44:Belong eth {0_0=no} 2 - 9 8	🔊 🔪 Input		
q45	Numeric	Logistic Regression: Options	🔪 Input		
q46	Numeric	-Statistics and Plate-	🔪 Input		
q47	Numeric		🔪 Input		
q48	Numeric	Correlations of estimates	🔪 Input		
q49	Numeric	1 Losmer-Lemeshow goodness, et al. 🔲 Iteration history	🔪 Input		
q50	Numeric	1 Casewise listing of residuals (Cl for exp(B):) 95 %	🔪 Input		
q51	Numeric	Outliers outside 2 std dev	🔪 Input		
q52	Numeric	All cases	🔪 Input		
q53	String	7 Display	🔪 Input		
q54	String	7 O At each step At last step	🔪 Input		
q55	String		S Input		
q56	String	7 Probability for Stepwise Classification cutoff: 0.5	🔪 Input		
q57	Numeric	1 Entry: 0.05 Removal: 0.10 Maximum Iterations:	🔪 Input		
q58	Numeric		S Input		
q59	Numeric	Conserve memory for complex analyses or large <u>d</u> atasets	🔪 Input		
q60	Numeric	1 🔽 Include constant in model	🔪 Input		
q61	Numeric		S Input		
q62	Numeric		🔪 Input		
q63	Numeric	1 U Qb3:Freq visit n (U, U=never b - 9 8 🚍 Right 🛷 Scale	🖌 🖌 Input		
q64	Numeric	1 0 Q64:Freq visit {0, 0=never 6 - 9 8 🧮 Right 🖋 Scale	🔪 Input		
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Variable View	,				
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III. SPSS OUTPUT

```
LOGISTIC REGRESSION VARIABLES q52
/METHOD=ENTER q1 q2 q9 q39
/METHOD=ENTER q27 q28 q29 q30
/CLASSPLOT
/PRINT=GOODFIT CI(95)
/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
```

Logistic Regression

	Notes	
Output Created		30-MAR-2016 14:02:22
Comments		
Input	Data	C:\Users\1002678\AppData\Local\Temp
		atcom-1.sav
	Active Dataset	DataSet1
	File Label	CP05
	Filter	<none></none>
	Weight	<none></none>
	Split File	<none></none>
	N of Rows in Working Data	477
	File	477
Missing Value Handling	Definition of Missing	User-defined missing values are treated as
		missing
Syntax		LOGISTIC REGRESSION VARIABLES q52
		/METHOD=ENTER q1 q2 q9 q39
		/METHOD=ENTER q27 q28 q29 q30
		/CLASSPLOT
		/PRINT=GOODFIT CI(95)
		/CRITERIA=PIN(0.05) POUT(0.10)
		ITERATE(20) CUT(0.5).
Resources	Processor Time	00:00:00.08
	Elapsed Time	00:00:00.13

	Case Processing Summary						
Unweighted Case	S ^a	N	Percent				
Selected Cases	Included in Analysis	439	92.0				
	Missing Cases	38	8.0				
	Total	477	100.0				
Unselected Cases	;	0	.0				
Total		477	100.0				

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
0=no	0
1=yes	1

		Classifica	tion ladie ^{a,5}		
	Predicted				
		Q52:Wor		w/others on	
			community	v problems	Percentage
	Observed		0=no	1=yes	Correct
Step 0	Q52:Worked w/others on	0=no	260	0	100.0
	community problems	1=yes	179	0	.0
	Overall Percentage				59.2

ocification Table^{a,b} <u>___</u>

a. Constant is included in the model.

b. The cut value is .500

Note: Class calls this the "stupid table."

Variables in the Equation

		В	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	373	.097	14.773	1	.000	.688

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	q1	.005	1	.942
		q2	4.438	1	.035
		q9	1.155	1	.282
		q39	18.685	1	.000
	Overall Stat	tistics	26.578	4	.000

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	27.343	4	.000
	Block	27.343	4	.000
	Model	27.343	4	.000

Model Summary

		Cox & Snell R	Nagelkerke R
Step	-2 Log likelihood	Square	Square
1	566.208 ^a	.060	.081

a. Estimation terminated at iteration number 4 because

parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	9.027	8	.340

		Q52:Worked w/others on community problems = $0=00$		Q52:Worked		
		Observed	Expected	Observed	Expected	Total
Step 1	1	35	34.578	9	9.422	44
	2	28	32.295	16	11.705	44
l	3	30	30.611	14	13.389	44
	4	28	28.966	16	15.034	44
	5	34	26.911	10	17.089	44
	6	24	25.216	21	19.784	45
	7	26	22.544	17	20.456	43
	8	22	22.154	23	22.846	45
	9	18	20.047	26	23.953	44
	10	15	16.679	27	25.321	42

Contingency Table for Hosmer and Lemeshow Test

Classification Table^a

			Predicted					
			Q52:Worked	Q52:Worked w/others on				
			community	Percentage				
	Observed		0=no	1=yes	Correct			
Step 1	Q52:Worked w/others on	0=no	209	51	80.4			
•	community problems	1=yes	108	71	39.7			
	Overall Percentage	-			63.8			

a. The cut value is .500

								95% C.I.for EXP(B)
		В	S.E.	Wald	df	Sig.	Exp(B)	Lower
Step 1 ^a	q1	.043	.057	.568	1	.451	1.044	.934
	q2	133	.055	5.766	1	.016	.876	.786
	q9	049	.047	1.090	1	.297	.953	.870
	q39	.967	.209	21.354	1	.000	2.630	1.745
	Constant	211	.408	.268	1	.605	.810	

Variables in the Equation

Variables in the Equation

		95% C.I.for EXP(B)
		Upper
Step 1 ^a	q1	1.167
	<u>q2</u>	.976
	<u>q9</u>	1.044
	<u>q</u> 39	3.963
	Constant	

a. Variable(s) entered on step 1: q1, q2, q9, q39.



Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	25.752	4	.000
	Block	25.752	4	.000
	Model	53.095	8	.000

Model Summary

		Cox & Snell R	Nagelkerke R
Step	-2 Log likelihood	Square	Square
1	540.457ª	.114	.154

a. Estimation terminated at iteration number 4 because

parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.		
1	9.919	8	.271		

		Q52:Worked w/others on community problems = 0=no		Q52:Worked community prol		
		Observed	Expected	Observed	Expected	Total
Step 1	1	39	38.322	5	5.678	44
	2	35	34.382	9	9.618	44
	3	30	31.757	14	12.243	44
	4	24	28.916	20	15.084	44
	5	26	26.817	18	17.183	44
	6	28	24.768	16	19.232	44
	7	30	22.659	14	21.341	44
	8	21	20.820	23	23.180	44
	9	16	18.273	28	25.727	44
	10	11	13.287	32	29.713	43

Contingency Table for Hosmer and Lemeshow Test

Classification Table^a

			Predicted					
			Q52:Worked	w/others on				
			community	community problems				
	Observed		0=no	1=yes	Correct			
Step 1	Q52:Worked w/others on	0=no	207	53	79.6			
	community problems	1=yes	93	86	48.0			
	Overall Percentage	-			66.7			

a. The cut value is .500

								95% C.I.for EXP(B)
		В	S.E.	Wald	df	Sig.	Exp(B)	Lower
Step 1 ^a	q1	.060	.059	1.029	1	.310	1.062	.945
	<u>q</u> 2	161	.057	7.834	1	.005	.852	.761
	q9	058	.057	1.026	1	.311	.944	.843
	q39	.954	.219	18.947	1	.000	2.595	1.689
	q27	.225	.065	11.912	1	.001	1.252	1.102
	q28	.041	.054	.566	1	.452	1.042	.936
	q29	267	.076	12.463	1	.000	.766	.660
	q30	.008	.056	.018	1	.893	1.008	.903
	Constant	.184	.482	.146	1	.702	1.202	

Variables in the Equation

	Variables in the Equation	
		95% C.I.for EXP(B)
		Upper
Step 1ª	q1	1.193
	<u>q</u> 2	.953
	<u>q</u> 9	1.056
	<u>q</u> 39	3.988
	q27	1.423
	q28	1.159
	q29	.888
	q30	1.125
	Constant	

a. Variable(s) entered on step 1: q27, q28, q29, q30.



Each Symbol Represents 1 Case.

Step number: 1

IV. TABLING RESULTS

Table 1: Prediction of Working with others in community to solve a problem

]							
	r	Final	Block	Model	Model	Cox &	Nag.	Hosmer
		Exp	Chi-Sq	Chi-Sq	-2LL	Snell	R^2	&
		(B)	1	1		\mathbb{R}^2		Lem.
								Chi-Sq
Block 1:			27.34***	27.34***	566.21	.06	.08	9.03
Comm. Con								
Q1: where you	01	1.06						
live								
Q2: How long	10*	.85**						
live there								
Q9: How sig.	05	.94						
comm. is to								
you								
Q39: Collected	.21**	2.60***						
neigh mail								
while away								
Block 2:			25.75***	53.10***	540.46	.11	.15	9.92
Sense of								
Comm								
Q27: Feel part	.12**	1.25**						
of comm.								
Q28: Id.	.09 ^a	1.04						
Strongly with								
comm.								
Q29: Enjoy	07	.77**						
living in								
comm.								
Q30: Feel safe	03	1.01						
and secure in								
comm								

^a*p*<.10; **p*<.05; ***p*<.01; ****p*<.001

V. WRITE UP OF RESULTS

Logistic regression was used to predict the odds that people work together to solve a common problem in their community, based on a set of variables concerning community connections and sense of community. Binary logistics was used. The independent variables were placed into two blocks. Block 1 was titled Community Connections. This included variables related to how connected an individual was to community location. Block 2 was titled Sense of Community. This contained variables related to personal identification with the community.

Table 1 provides a summary of the findings. Both blocks revealed significant Chisquares: Block 1 (Community Connections) chi-sq = 27.34, p<.001. Block 2 (Sense of Community), chi-sq. = 25.75, p< .001. Each Exp (B) indicates an increase or a decrease in the odds of the occurrence of the dependent variable, assuming all other variables in the model are controlled for. Within each of the two blocks, two independent variables have significant unique contributions to the prediction of working with others in the community to solve a problem. In Block 1 the variable Q2 "how long a person lived in a community" had a final Exp (B) of .85, which means that there is a 15% decrease in the odds of a person working with others to solve community problems when the other independent variables are controlled for. Also in Block 1 the variable Q39 "collected neighbor's mail while away" had a final Exp (B) of 2.60, which means that there is an increase in the odds of 160% in community connections when the other variables are controlled for. In Block 2 (Sense of Community), the variable Q27 "feel part of the community" had a final Exp (B) of 1.25 suggesting there will be a predicted increase of 25% in the odds when all of the other variables are controlled for. Finally, the variable Q29 "enjoy living in the community" yielded an Exp (B) of .77 which supports the prediction of a 23% decrease in the odds that people would join together in solving a community problem when all other independent variables are controlled for. Table 1 also reveals that the Hosmer-Lemeshow Test, a test for the goodness of fit (how well the model fit the data), does not reveal any significance, indicating a good fit for the model overall. And, the Cox and Snell R² is .06 for Block 1 and .11 for the full Block 1/Block 2 model, indicating that the eight variables in the two blocks explain approximately 11% of the variance in the dependent variable. This is further confirmed by the Nagelkerke R² of .15 for the full model, estimating that 15% of the variance of the dependent variable is explained by the eight variables.

TABLE 2: 0	Classification	Results
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Classification Table ^a						
		Predicted				
		Q52:Worked w/others on community problems				
Observed		0=no	1=yes	Percentage Correct		
Q52:Worked w/others on community problems	0=no	207	53	79.6		
	1=yes	93	86	48.0		
Overall Percentage				66.7		

Press' Q Calculation

Formula: $[N-(nK)]^2 / N(K-1)$

Where N=total sample size

n=number of observations correctly classified

K=number of groups

In this model:

N=439 n = 293[207+86] K = 2 Press' Q = $[439-(293*2)]^2 / 439(2-1)$ = $[439-586]^2 / 439$ = 21,609 / 439 Press' Q = 49.2

df = 1

Chi-square critical = 10.83; p = .001

Table 2 shows that the extant model correctly classifies 67% of the cases. This is supported by the Press' Q and Critical Chi-square statistics. Press' Q was calculated at 49.2, while the Critical Chi-square for p=.001 is 10.83. Since the calculated Press' Q is greater than the Critical Chi Square, the accuracy of the predictions in this model is significantly greater than what could be expected by chance