3.11

code:

```
data wafer;
input trt $ num;
datalines;
A 8
A 7
A 6
A 6
A 3
A 4
A 7
A 2
A 3
A 4
B 9
B 9
B 8
B 14
B 8
B 13
B 11
B 5
B 7
B 6
;

proc genmod data = wafer;
class trt / param=ref ref=first;
model num = trt / dist=poisson link = log;
run;

proc means data=wafer;
class trt;
var num;
run;

proc genmod data = wafer;
model num = / dist=poi link=log scale = pearson;
run;
```

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	18	16.2676	0.9038
Scaled Deviance	18	16.2676	0.9038
Pearson Chi-Square	18	16.0444	0.8914
Scaled Pearson X2	18	16.0444	0.8914
Log Likelihood		138.2221	
Full Log Likelihood		-45.1746	
AIC (smaller is better)		94.3491	
AICC (smaller is better)		95.0550	
BIC (smaller is better)		96.3406	

:

Analysis Of Maximum Likelihood Parameter Estimates								
Parameter		DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept		1	1.6094	0.1414	1.3323	1.8866	129.51	<.0001
trt	B	1	0.5878	0.1764	0.2421	0.9335	11.11	0.0009
Scale		0	1.0000	0.0000	1.0000	1.0000		

The MEANS Procedure

Analysis Variable : num						
trt	N Obs	N	Mean	Std Dev	Minimum	Maximum
A	10	10	5.0000000	2.0548047	2.0000000	8.0000000
B	10	10	9.0000000	2.9059326	5.0000000	14.0000000

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	19	27.8570	1.4662
Scaled Deviance	19	19.0978	1.0051
Pearson Chi-Square	19	27.7143	1.4586
Scaled Pearson X2	19	19.0000	1.0000
Log Likelihood		90.7879	
Full Log Likelihood		-50.9692	
AIC (smaller is better)		103.9385	
AICC (smaller is better)		104.1607	
BIC (smaller is better)		104.9342	

Algorithm converged.

Analysis Of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	1.9459	0.1021	1.7459	2.1460	363.43	<.0001
Scale	0	1.2077	0.0000	1.2077	1.2077		

3.13
Code:

```
data crab;
input color spine width satell weight;
if satell>0 then y=1; if satell=0 then y=0; n=1;
weight = weight/1000; color = color - 1;
if color=4 then dark=0; if color < 4 then dark=1;
datalines;

…
;

proc genmod data = crab;
model satell = weight / dist=poisson link = log;
run;

proc genmod data = crab;
model satell =  / dist=poisson link = log;
run;
```

Output:
(with intercept)

Criteria For Assessing Goodness Of Fit			
Criterion	**DF**	**Value**	**Value/DF**
Deviance	171	560.8664	3.2799
Scaled Deviance	171	560.8664	3.2799
Pearson Chi-Square	171	535.8957	3.1339
Scaled Pearson X2	171	535.8957	3.1339
Log Likelihood		71.9524	
Full Log Likelihood		-458.0820	
AIC (smaller is better)		920.1641	
AICC (smaller is better)		920.2347	
BIC (smaller is better)		926.4707	

Analysis Of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	-0.4284	0.1789	-0.7791	-0.0777	5.73	0.0167
weight	1	0.5893	0.0650	0.4619	0.7167	82.15	<.0001
Scale	0	1.0000	0.0000	1.0000	1.0000		

w/t intercept

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	172	632.7917	3.6790
Scaled Deviance	172	632.7917	3.6790
Pearson Chi-Square	172	584.0436	3.3956
Scaled Pearson X2	172	584.0436	3.3956
Log Likelihood		35.9898	
Full Log Likelihood		-494.0447	
AIC (smaller is better)		990.0893	
AICC (smaller is better)		990.1127	
BIC (smaller is better)		993.2426	

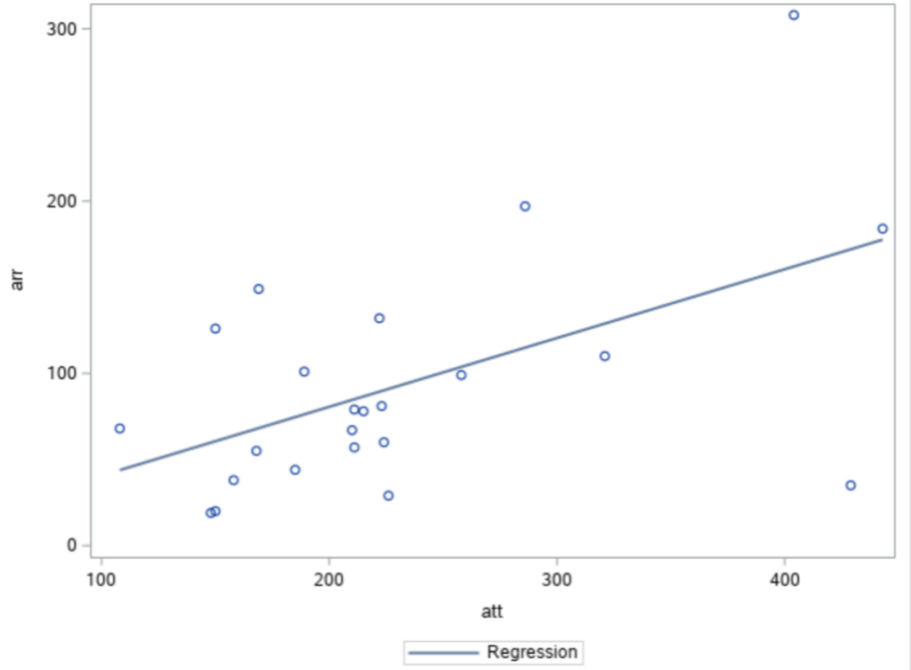
Analysis Of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	1.0713	0.0445	0.9840	1.1585	579.54	<.0001
Scale	0	1.0000	0.0000	1.0000	1.0000		

3.18
Code;

```
data soccer;
input team $ att arr;
logt = log(att);
datalines;
AV 404 308
BC 286 197
LU 443 184
Bo 169 149
WB 222 132
Hu 150 126
Mi 321 110
Br 189 101
IT 258 99
LC 223 81
Bl 211 79
CP 215 78
Sh 108 68
ST 210 67
SU 224 60
SC 211 57
Ba 168 55
Mi 185 44
HC 158 38
MC 429 35
Pl 226 29
Re 150 20
Ol 148 19
;

proc genmod data =soccer;
model arr/att= / dist=poisson link = log;
run;

proc sgplot data = soccer;
reg y=arr x =att;
run;

proc genmod data =soccer;
model arr/att= / dist=poisson link = log residuals;
run;

proc genmod data =soccer;
model arr= / dist=negbin link = log offset=logt;
run;
```

Output:

Analysis Of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	-0.9103	0.0216	-0.9527	-0.8679	1769.91	<.0001
Scale	0	1.0000	0.0000	1.0000	1.0000		



Observation Statistics						
Observation	Raw Residual	Pearson Residual	Deviance Residual	Std Deviance Residual	Std Pearson Residual	Likelihood Residual
1	145.42577	11.405531	14.715211	15.309349	11.866039	15.074951
2	81.910324	7.6352007	9.7788764	10.053472	7.8496006	9.9471787
3	5.7317253	0.4292876	0.5543892	0.5790803	0.448407	0.5693227
4	80.992464	9.8212348	12.998351	13.210353	9.9814179	13.119801
5	42.664657	4.5139485	5.764041	5.8884954	4.6114115	5.8406809
6	65.638282	8.4484377	11.054528	11.214114	8.570402	11.148016
7	-19.17408	-1.687045	-2.203212	-2.273013	-1.740494	-2.244402
8	24.944235	2.8602508	3.6573141	3.7242185	2.9125743	3.6983781
9	-4.822155	-0.473256	-0.613835	-0.62932	-0.485195	-0.623086
10	-8.737755	-0.922385	-1.200262	-1.226298	-0.942393	-1.215705
11	-5.908817	-0.641245	-0.832916	-0.849981	-0.654383	-0.843073
12	-8.518463	-0.915813	-1.191797	-1.216693	-0.934944	-1.20656
13	24.539563	3.722372	4.7549333	4.8040577	3.7608288	4.7850988
14	-17.50641	-1.904374	-2.498532	-2.549473	-1.943201	-2.528251
15	-30.14017	-3.174581	-4.214908	-4.306761	-3.243763	-4.267257
16	-27.90882	-3.028761	-4.018921	-4.101262	-3.090816	-4.065891
17	-12.60512	-1.533054	-2.007974	-2.040525	-1.557906	-2.027011
18	-30.44612	-3.528669	-4.724455	-4.809002	-3.591817	-4.771804
19	-25.58101	-3.208145	-4.291912	-4.357251	-3.256985	-4.328541
20	-137.6345	-10.47523	-15.06428	-15.71261	-10.92606	-15.38118
21	-61.94499	-6.495563	-9.080301	-9.280009	-6.638423	-9.183038
22	-40.36172	-5.195039	-7.243659	-7.348231	-5.270037	-7.297633
23	-40.5569	-5.255314	-7.3463	-7.450909	-5.330148	-7.400019

Analysis Of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	-0.9052	0.1200	-1.1404	-0.6700	56.91	<.0001
Dispersion	1	0.3189	0.0936	0.1794	0.5668		

3.20

Code:

```
data cor;
input age1 age $ S1 S $ x y;
r = x/y*1000;
logt=log(y);
datalines;
1 35-44 0 0 2 18793
1 35-44 1 1 32 52407
2 45-54 0 0 12 10673
2 45-54 1 1 104 43248
3 55-64 0 0 28 5710
3 55-64 1 1 206 28612
4 65-74 0 0 28 2585
4 65-74 1 1 186 12663
5 75-84 0 0 31 1462
5 75-84 1 1 102 5317
;

proc genmod data=cor;
class age/ param=ref ref=first;
class S/ para=ref ref=first;
model x = age S/ dist=poisson link = log offset=logt scale=pearson;
run;

proc genmod data = cor;
model x = age1 S1 age1*S1/ dist=poisson link=log offset=logt scale=pearson;
run;
```

Output:
w/t interaction:

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	4	12.1339	3.0335
Scaled Deviance	4	4.3504	1.0876
Pearson Chi-Square	4	11.1565	2.7891
Scaled Pearson X2	4	4.0000	1.0000
Log Likelihood		976.0751	
Full Log Likelihood		-33.6009	
AIC (smaller is better)		79.2019	
AICC (smaller is better)		107.2019	
BIC (smaller is better)		81.0174	

Analysis Of Maximum Likelihood Parameter Estimates								
Parameter		DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept		1	-7.9194	0.3203	-8.5470	-7.2917	611.50	<.0001
age	45-54	1	1.4840	0.3258	0.8454	2.1227	20.74	<.0001
age	55-64	1	2.6275	0.3068	2.0261	3.2289	73.33	<.0001
age	65-74	1	3.3505	0.3086	2.7456	3.9554	117.86	<.0001
age	75-84	1	3.7001	0.3210	3.0709	4.3293	132.85	<.0001
S	1	1	0.3545	0.1793	0.0031	0.7060	3.91	0.0480
Scale		0	1.6701	0.0000	1.6701	1.6701		

With interaction:

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	6	59.8953	9.9825
Scaled Deviance	6	6.4056	1.0676
Pearson Chi-Square	6	56.1029	9.3505
Scaled Pearson X2	6	6.0000	1.0000
Log Likelihood		288.5963	
Full Log Likelihood		-57.4816	
AIC (smaller is better)		122.9632	
AICC (smaller is better)		130.9632	
BIC (smaller is better)		124.1735	

Analysis Of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	-8.8672	0.9347	-10.6992	-7.0351	89.99	<.0001
age1	1	1.0468	0.2368	0.5828	1.5109	19.55	<.0001
S1	1	1.2837	0.9964	-0.6692	3.2366	1.66	0.1976
age1*S1	1	-0.2490	0.2556	-0.7500	0.2520	0.95	0.3300
Scale	0	3.0579	0.0000	3.0579	3.0579		