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## LAMPIRAN

### Lampiran 1

#### Data Asuransi Kendaraan *Automobile Claim Datasets in Australia* Tahun 2004-2005

No.	$W_i$	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$	Y
1	0.30	1.06	1	5	1	5	0
2	0.65	1.03	3	5	1	2	0
3	0.57	3.26	3	13	1	5	0
4	0.32	4.14	3	11	1	5	0
5	0.65	0.72	2	5	1	5	0
6	0.85	2.01	1	4	2	2	0
7	0.85	1.60	1	8	2	2	0
8	0.56	1.47	3	5	2	3	0
9	0.36	0.52	2	5	1	4	0
10	0.52	0.38	2	5	1	5	0
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
425	0.85	3.14	1	12	2	6	2
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
2045	0.61	1.80	3	10	2	3	3
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
15147	0.85	2.20	1	11	1	4	4
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
67847	0.85	2.82	3	11	1	2	1
67848	0.93	0.73	2	10	2	1	1
67849	0.32	1.33	2	11	1	4	0
67850	0.68	1.98	3	5	1	4	1
67851	0.85	3.55	3	11	2	4	0
67852	0.65	1.07	3	10	2	3	0
67853	0.91	1.23	2	10	2	4	0
67854	0.31	1.93	2	11	2	4	0
6	.	0.97	1	5	1	5	1
6	.	1.02	1	5	2	6	0



## Lampiran 2

### One-Sample Kolmogorov-Smirnov Test

		X1	X2	X3	X4	X5	X6	Y
<b>N</b>		67856 <sup>c</sup>	67856 <sup>d</sup>	67856	67856	67856	67856	67856
<b>Poisson Parameter<sup>a,b</sup></b>	<b>Mean</b>	.46865154	1.77702	2.31	8.79	1.43	3.31	.07
<b>Most Extreme Differences</b>	<b>Absolute</b>			.099	.275	.239	.085	.002
	<b>Positive</b>			.085	.187	.174	.052	.002
	<b>Negative</b>			-.099	-.275	-.239	-.085	-.002
<b>Kolmogorov-Smirnov Z</b>				25.856	71.693	62.269	22.063	.529
<b>Asymp. Sig. (2-tailed)</b>				.000	.000	.000	.000	.943
a. Test distribution is Poisson.								
b. Calculated from data.								
c. Poisson variables are non-negative integers. The value .002738 occurs in the data. One-Sample Kolmogorov-Smirnov Test cannot be performed.								
d. Poisson variables are non-negative integers. The value .180 occurs in the data. One-Sample Kolmogorov-Smirnov Test cannot be performed.								



### Lampiran 3

**Tabel Kolmogorov-Smirnov**

SAMPLE SIZE (N)	LEVEL OF SIGNIFICANCE FOR D = MAXIMUM [ F <sub>0</sub> (X) - S <sub>n</sub> (X) ]				
	.20	.15	.10	.05	.01
1	.900	.925	.950	.975	.995
2	.684	.726	.776	.842	.929
3	.565	.597	.642	.708	.828
4	.494	.525	.564	.624	.733
5	.446	.474	.510	.565	.669
6	.410	.436	.470	.521	.618
7	.381	.405	.438	.486	.577
8	.358	.381	.411	.457	.543
9	.339	.360	.388	.432	.514
10	.322	.342	.368	.410	.490
11	.307	.326	.352	.391	.468
12	.295	.313	.338	.375	.450
13	.284	.302	.325	.361	.433
14	.274	.292	.314	.349	.418
15	.266	.283	.304	.338	.404
16	.258	.274	.295	.328	.392
17	.250	.266	.286	.318	.381
18	.244	.259	.278	.309	.371
19	.237	.252	.272	.301	.363
20	.231	.246	.264	.294	.356
25	.210	.220	.240	.270	.320
30	.190	.200	.220	.240	.290
35	.180	.190	.210	.230	.270
OVER 35	<u>1.07</u> √N	<u>1.14</u> √N	<u>1.22</u> √ N	<u>1.36</u> √N	<u>1.63</u> √N

Sumber : Sidney Siegel, N. John Castellan, Jr., *Nonparametric Statistic for the Behavioral Sciences Second Edition.*



## Lampiran 4

### Syntaks Rstudio untuk memperoleh model Regresi Poisson

#Beberapa package yang perlu diinstal

```
>install.packages("xts")
```

```
>library(xts)
```

```
>install.packages("sp")
```

```
>library(sp)
```

```
>install.packages("CASdatasets", repos = "http://cas.uqam.ca/pub/R/",  
type='source')
```

```
>library(CASdatasets)
```

```
>install.packages("MASS")
```

```
> library(MASS)
```

```
> summary(model.freqP <-glm(ClaimNb ~ VehValue + VehAge + VehBody + Gender + DrivAge + offset(log(Exposure)), family=poisson("log"), data=ausprivauto0405[ausprivauto0405$Exposure > 0,]))
```



## Lampiran 5

### Output Model Regresi Poisson

```
Call:
glm(formula = ClaimNb ~ VehValue + VehAge + VehBody + Gender +
     DrivAge + offset(log(Exposure)), family = poisson("log"),
     data = ausprivauto0405[ausprivauto0405$Exposure > 0, ])
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-0.9082	-0.4524	-0.3462	-0.2213	4.5123

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )	
(Intercept)	-1.19827	0.32076	-3.736	0.000187	**
* VehValue	0.02390	0.01720	1.390	0.164623	
VehAgeoldest cars	-0.05933	0.04108	-1.444	0.148706	
VehAgeyoung cars	0.11145	0.03967	2.810	0.004958	**
VehAgeyoungest cars	0.05550	0.04819	1.152	0.249471	
VehBodyConvertible	-1.67029	0.66784	-2.501	0.012383	*
VehBodyCoupe	-0.51094	0.33695	-1.516	0.129432	
VehBodyHardtop	-0.83353	0.32785	-2.542	0.011009	*
VehBodyHatchback	-0.97543	0.31821	-3.065	0.002174	**
VehBodyMinibus	-0.98426	0.35005	-2.812	0.004927	**
VehBodyMotorized caravan	-0.38795	0.40942	-0.948	0.343344	
VehBodyPanel van	-0.85291	0.33883	-2.517	0.011829	*
VehBodyRoadster	-0.56485	0.65987	-0.856	0.391995	
VehBodySedan	-0.92396	0.31764	-2.909	0.003628	**
VehBodyStation wagon	-0.91190	0.31806	-2.867	0.004143	**
VehBodyTruck	-0.96325	0.32836	-2.933	0.003352	**
VehBodyUtility	-1.12006	0.32208	-3.478	0.000506	**
* GenderMale	-0.02289	0.03009	-0.761	0.446929	
DrivAgeolder work. people	0.21907	0.04891	4.479	7.50e-06	**
* DrivAgeoldest people	0.01580	0.06433	0.246	0.806052	
DrivAgeworking people	0.24752	0.04904	5.048	4.47e-07	**
* DrivAgeyoung people	0.30747	0.05068	6.067	1.30e-09	**
* DrivAgeyoungest people	0.47769	0.05904	8.091	5.93e-16	**
* ---					

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)

Null deviance: 25507 on 67855 degrees of freedom  
Residual deviance: 25343 on 67833 degrees of freedom

324

of Fisher Scoring iterations: 6



## Lampiran 6

### Syntaks dan Output Model Regresi Binomial Negatif

```
> library(MASS)
> summary(model.freqNB <-glm.nb(ClaimNb ~ VehValue + VehAge + VehBody
+ Gender + DrivAge + offset(log(Exposure)),
data=ausprivauto0405[ausprivauto0405$ Exposure > 0,]))
```

Output :

```
> library(MASS)
> summary(model.freqNB <-glm.nb(ClaimNb ~ VehValue + VehAge + VehBody + G
ender + DrivAge + offset(log(Exposure)), data=ausprivauto0405[ausprivauto
0405$Exposure > 0,]))
Call:
glm.nb(formula = ClaimNb ~ VehValue + VehAge + VehBody + Gender +
      DrivAge + offset(log(Exposure)), data = ausprivauto0405[ausprivauto04
05$Exposure >
      0, ], init.theta = 2.259193458, link = log)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-0.8702	-0.4478	-0.3443	-0.2209	4.0965

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )	
(Intercept)	-1.20475	0.33898	-3.554	0.000379	***
VehValue	0.02510	0.01761	1.425	0.154129	
VehAgeoldest cars	-0.05695	0.04191	-1.359	0.174202	
VehAgeyoung cars	0.11057	0.04056	2.726	0.006410	**
VehAgeyoungest cars	0.05229	0.04926	1.062	0.288415	
VehBodyConvertible	-1.66779	0.68212	-2.445	0.014485	*
VehBodyCoupe	-0.50418	0.35526	-1.419	0.155852	
VehBodyHardtop	-0.82954	0.34608	-2.397	0.016532	*
VehBodyHatchback	-0.96779	0.33647	-2.876	0.004024	**
VehBodyMinibus	-0.98261	0.36790	-2.671	0.007566	**
VehBodyMotorized caravan	-0.38191	0.42929	-0.890	0.373659	
VehBodyPanel van	-0.85100	0.35711	-2.383	0.017173	*
VehBodyRoadster	-0.57352	0.68854	-0.833	0.404874	
VehBodySedan	-0.91782	0.33591	-2.732	0.	
**					
VehBodyStation wagon	-0.90735	0.33633	-2.698	0.006980	**
VehBodyTruck	-0.96101	0.34654	-2.773	0.005552	**
VehBodyUtility	-1.11621	0.34026	-3.280	0.001036	**
GenderMale	-0.02269	0.03074	-0.738	0.460470	
DrivAgeolder work. people	0.21975	0.04983	4.410	1.04e-05	***
DrivAgeoldest people	0.01496	0.06548	0.228	0.819310	
DrivAgeworking people	0.24843	0.04997	4.971	6.65e-07	***
DrivAgeyoung people	0.30730	0.05169	5.945	2.76e-09	***
DrivAgeyoungest people	0.48138	0.06035	7.977	1.50e-15	***

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
(Dispersion parameter for Negative Binomial(2.2592) family taken to be 1)

Null deviance: 23577 on 67855 degrees of freedom

deviance: 23420 on 67833 degrees of freedom

86

Fisher Scoring iterations: 1

Theta: 2.259

Std. Err.: 0.417

-2loglikelihoood: -34738.308





## Lampiran 7

### Syntaks dan Output Model Regresi Poisson 2

```
> library(MASS)
> summary(model.freqP <- glm(ClaimNb ~ VehValue + VehAge + VehBody +
  Gender + DrivAge + offset(log(Exposure)), family=poisson("log"),
  data=ausprivauto0405[ausprivauto0405$Exposure > 0,]))
```

Output:

```
Call:
glm(formula = ClaimNb ~ VehAge + VehBody + DrivAge + offset(log(Exposure)),
     family = poisson("log"), data = ausprivauto0405[ausprivauto0405$Exposure > 0, ])
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-0.9012	-0.4525	-0.3464	-0.2215	4.5301

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )	
(Intercept)	-1.16900	0.31874	-3.668	0.000245	**
*					
VehAgeoldest cars	-0.07893	0.03877	-2.036	0.041770	*
VehAgeyoung cars	0.12734	0.03798	3.353	0.000801	**
*					
VehAgeyoungest cars	0.08494	0.04308	1.971	0.048673	*
VehBodyConvertible	-1.52138	0.65842	-2.311	0.020852	*
VehBodyCoupe	-0.49878	0.33686	-1.481	0.138691	
VehBodyHardtop	-0.82380	0.32780	-2.513	0.011965	*
VehBodyHatchback	-0.98946	0.31773	-3.114	0.001845	**
VehBodyMinibus	-0.96918	0.34992	-2.770	0.005610	**
VehBodyMotorized caravan	-0.34923	0.40843	-0.855	0.392518	
VehBodyPanel van	-0.86285	0.33876	-2.547	0.010862	*
VehBodyRoadster	-0.51845	0.65889	-0.787	0.431367	
VehBodySedan	-0.92915	0.31749	-2.927	0.003427	**
VehBodyStation wagon	-0.89131	0.31777	-2.805	0.005034	**
VehBodyTruck	-0.95912	0.32827	-2.922	0.003481	**
VehBodyUtility	-1.11938	0.32206	-3.476	0.000509	**
*					
DrivAgeolder work. people	0.21879	0.04889	4.475	7.65e-06	**
*					
DrivAgeoldest people	0.01199	0.06427	0.187	0.852014	
DrivAgeworking people	0.24848	0.04899	5.072	3.94e-07	**
*					
DrivAgeyoung people	0.30816	0.05063	6.087	1.15e-09	**
DrivAgeyoungest people	0.47804	0.05903	8.099	5.56e-16	**

codes: 0 '\*\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1



(Dispersion parameter for poisson family taken to be 1)

Null deviance: 25507 on 67855 degrees of freedom  
Residual deviance: 25345 on 67835 degrees of freedom  
AIC: 34822

Number of Fisher Scoring iterations: 6



## Lampiran 8

### Syntaks dan Output Model Regresi Binomial Negatif 2

```
> summary(model.freqNB2 <-glm.nb(ClaimNb ~ VehAge + VehBody + DrivAge + offset(log(Exposure)), data=ausprivauto0405[ausprivauto0405$Exposure > 0,]))
```

**Output :**

```
Call:
glm.nb(formula = ClaimNb ~ VehAge + VehBody + DrivAge + offset(log(Exposure)),
      data = ausprivauto0405[ausprivauto0405$Exposure > 0, ], init.theta = 2.26041257,
      link = log)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-0.8637	-0.4480	-0.3444	-0.2211	4.1556

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )	
(Intercept)	-1.17389	0.33706	-3.483	0.000496	**
* VehAgeoldest cars	-0.07741	0.03954	-1.957	0.050296	.
VehAgeyoung cars	0.12724	0.03883	3.277	0.001050	**
VehAgeyoungest cars	0.08306	0.04403	1.887	0.059207	.
VehBodyConvertible	-1.51297	0.67287	-2.249	0.024542	*
VehBodyCoupe	-0.49128	0.35525	-1.383	0.166692	
VehBodyHardtop	-0.81872	0.34610	-2.366	0.018003	*
VehBodyHatchback	-0.98211	0.33607	-2.922	0.003474	**
VehBodyMinibus	-0.96621	0.36783	-2.627	0.008620	**
VehBodyMotorized caravan	-0.34201	0.42845	-0.798	0.424715	
VehBodyPanel van	-0.86015	0.35711	-2.409	0.016011	*
VehBodyRoadster	-0.52372	0.68765	-0.762	0.446296	
VehBodySedan	-0.92280	0.33584	-2.748	0.006000	**
VehBodyStation wagon	-0.88511	0.33612	-2.633	0.008455	**
VehBodyTruck	-0.95583	0.34653	-2.758	0.005811	**
VehBodyUtility	-1.11452	0.34031	-3.275	0.001057	**
DrivAgeolder work. people	0.21937	0.04981	4.404	1.06e-05	**
* DrivAgeoldest people	0.01097	0.06542	0.168	0.866770	
DrivAgeworking people	0.24930	0.04992	4.993	5.93e-07	**
* DrivAgeyoung people	0.30782	0.05163	5.962	2.50e-09	**
* DrivAgeyoungest people	0.48159	0.06033	7.982	1.44e-15	**
* ---					
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Dispersion parameter for Negative Binomial(2.2604) family taken

Null deviance: 23578 on 67855 degrees of freedom  
 Residual deviance: 23423 on 67835 degrees of freedom



AIC: 34785

Number of Fisher Scoring iterations: 1

Theta: 2.260  
Std. Err.: 0.417

2 x log-likelihood: -34740.666

