SAS002 Model1

QUESTION #1: IS IT TRUE THAT THE (AVERAGE) BLOOD PRESSURE FOR SMOKERS IS HIGHER THAN IT IS FOR NON SMOKERS?

If the risk of a stroke is believed to be affected by the age and blood (pressure).

(Risk is measured in risk units).

Age is measured in years.

Blood Pressure is measured in blood pressure units)

Then answer the following questions

Questions #2 - #10

- By how much does the risk increase if age increases by one year?
- By how much does the risk increase if blood pressure increases by one unit?
- By how much does risk increase if blood pressure increases by 1%?

For smokers only:

- By how much does the risk increase if age increases by ten years?
- By how much does the risk increase if blood pressure increases by 10 units?
- By how much does risk increase if blood pressure increases by 10%?

For non-smokers only:

- By how much does the risk increase if age increases by ten years?
- By how much does the risk increase if blood pressure increases by 10 units?
- By how much does risk increase if blood pressure increases by 10%?

```
data first;
    input risk Age Pressure Smoker $;
    lage = log(age);
    lrisk =log(risk);
```

```
      lpressure =log(pressure);
      cards;

12     57     152    No
24     67     163    No
13     58     155    No
56     86     177    Yes
28     59     196    No
51     76     189    Yes
18     56     155    Yes
31     78     120    No
37     80     135    Yes
15     78      98    No
22     71     152    No
36     70     173    Yes
15     67     135    Yes
48     77     209    Yes
15     60     199    No
36     82     119    Yes
8      66     166    No
34     80     125    Yes
3      62     117    No
37     59     207    Yes
;
proc reg; model risk = age pressure;
        model lrisk = lage lpressure;

data second; set first; if smoker ='Yes';
  proc reg; model risk = age pressure;
  proc reg; model lrisk = lage lpressure;

       data third; set first; if smoker ='No';
        proc reg; model  risk = age pressure;
        proc reg; model  lrisk = lage lpressure;
run;
```

ANSWERS

- By how much does the risk increase if age increases by one year?
  1.31 RISK UNITS.
- By how much does the risk increase if blood pressure increases by one unit?
  0.296 UNITS OF RISK
- By how much does risk increase if blood pressure increases by 1% ?
  RISK INCREASES BY 2.02%

For smokers only:

- By how much does the risk increase if age increases by ten years?
  RISK INCREASES BY 10.8 UNITS
- By how much does the risk increase if blood pressure increases by 10 units?
  RISK INCREASES BY 2.86 UNITS
- By how much does risk increase if blood pressure increases by 10%?
  Risk increases by 13.72%

For non smokers only:

- By how much does the risk increase if age increases by ten years?
  Risk increases by 9.77 units.
- By how much does the risk increase if blood pressure increases by 10 units?
  Risk increases by ZERO units
- By how much does risk increase if blood pressure increases by 10%?
  Risk increases by zero Percent

OUTPUT:

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: risk

Number of Observations Read	20
Number of Observations Used	20

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	**1**	-110.94226	16.46987	-6.74	<.0001
Age	**1**	1.31500	0.17329	7.59	<.0001
Pressure	**1**	0.29640	0.05107	5.80	<.0001

The SAS System

The REG Procedure
Model: MODEL2
Dependent Variable: lrisk

Number of Observations Read	20
Number of Observations Used	20

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	6.19594	3.09797	15.02	0.0002
Error	17	3.50660	0.20627		
Corrected Total	19	9.70254			

Root MSE	0.45417	**R-Square**	0.6386
Dependent Mean	3.10107	**Adj R-Sq**	0.5961
Coeff Var	14.64561		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	**1**	-23.52058	4.86768	-4.83	0.0002
lage	**1**	3.88427	0.79270	4.90	0.0001
lpressure	**1**	2.02274	0.51419	3.93	0.0011

SMOKERS

The REG Procedure
Model: MODEL1
Dependent Variable: risk

Number of Observations Read	10
Number of Observations Used	10

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	1411.21897	705.60948	40.36	0.0001
Error	7	122.38103	17.48300		
Corrected Total	9	1533.60000			

Root MSE	4.18127	**R-Square**	0.9202
Dependent Mean	36.80000	**Adj R-Sq**	0.8974
Coeff Var	11.36214		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	**1**	-89.02369	14.10376	-6.31	0.0004
Age	**1**	1.08324	0.14381	7.53	0.0001
Pressure	**1**	0.28585	0.04312	6.63	0.0003

SMOKERS

The REG Procedure
Model: MODEL1
Dependent Variable: lrisk

Number of Observations Read	10
Number of Observations Used	10

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	1.33848	0.66924	16.26	0.0023
Error	7	0.28816	0.04117		
Corrected Total	9	1.62664			

Root MSE	0.20289	**R-Square**	0.8228
Dependent Mean	3.53420	**Adj R-Sq**	0.7722
Coeff Var	5.74088		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	**1**	-13.69693	3.02591	-4.53	0.0027
lage	**1**	2.39776	0.48730	4.92	0.0017
lpressure	**1**	1.37166	0.33711	4.07	0.0048

NON SMOKERS

The REG Procedure
Model: MODEL1
Dependent Variable: risk

Number of Observations Read	10
Number of Observations Used	10

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	335.38212	167.69106	3.08	0.1100
Error	7	381.51788	54.50255		
Corrected Total	9	716.90000			

Root MSE	7.38258	**R-Square**	0.4678
Dependent Mean	17.10000	**Adj R-Sq**	0.3158
Coeff Var	43.17301		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	**1**	-77.58955	38.26462	-2.03	0.0822
Age	**1**	0.97729	0.40876	2.39	0.0481
Pressure	**1**	0.20144	0.09840	2.05	0.0799

NON SMOKERS

The REG Procedure
Model: MODEL1
Dependent Variable: lrisk

Number of Observations Read	10
Number of Observations Used	10

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	2.09940	1.04970	3.30	0.0977
Error	7	2.22436	0.31777		
Corrected Total	9	4.32375			

Root MSE	0.56371	**R-Square**	0.4855
Dependent Mean	2.66793	**Adj R-Sq**	0.3386
Coeff Var	21.12900		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	**1**	-30.72839	13.02143	-2.36	0.0504
lage	**1**	5.01205	2.10746	2.38	0.0490
lpressure	**1**	2.49175	1.09039	2.29	0.0562