PROC REG

Using SAS Linear Regression PROC REG to Estimate the Parameters of an Exponential Function

Basic Math

$$y = f(x) = e^{x}$$

$$Ln(y) = Ln(e^{x}) = e^{Ln(x)}$$

$$Ln(y) = x$$

Basic Math Cont'

- Linear Regression: Dependent Variable is Ln(y); Independent Variable is x

- AntiLog: $\widehat{P} = Exp(Ln(\widehat{P})) = e^{Ln(\widehat{P})} = e^{(ax+c)}$

```
data Example1;
   input X Y;
Y1=LOG(Y);
datalines;
1      3
2      7
3      20
4      54
5      149
6      403
7      1095
proc reg data=Example1;
   model Y1 = X;
   output out=outreg
          P=LOG_Y1_Hat;
run;
Proc Print data=outreg;
Title1 Regression Outcome;
run;
Data outreg1;
Set  outreg;
Y_Hat=EXP(LOG_Y1_Hat);
Run;
Title1 Final output;
Proc Print data=outreg1;
Run;
Proc GPlot data=outreg1;
Plot Y_Hat*X='P';
Plot2 Y*X='A';
Run;
```

Regression Result

- **R-Square : 0.9996**
- **Intercept (c) : 0.030950**
- **X (a) : 0.99336**

Final Result

		$y = f(x) = e^{x}$	$Ln(y)$	$Ln\ (\widehat{P}\ ) = ax + c$	$e^{(ax+c)}$
Obs	**X**	**Y**	**Y1**	**LOG_Y1_Hat**	**Y_Hat**
1	1	3	1.09861	1.02431	2.79
2	2	7	1.94591	2.01766	7.52
3	3	20	2.99573	3.01102	20.31
4	4	54	3.98898	4.00438	54.84
5	5	149	5.00395	4.99773	148.08
6	6	403	5.99894	5.99109	399.85
7	7	1095	6.99851	6.98444	1079.7

a=0.99336
c=0.03095