TECHNOLOGY CORNER

30. Transforming to achieve linearity on the HP Prime



We'll use the planet data to illustrate a general strategy for performing transformations on the HP Prime. Although we will focus on transformations involving natural logarithms, the same approach can be used for roots, powers, or any other type of transformation of the data.

• Press and tap the *Statistics 2Var* app icon. Enter the distance from sun data in C1 and the period of revolution data in C2.

	Stat	tistics 2Var N	lumerio	: View	14:12
	C1	C2	C3		C4
1	.387	.241			
2	.723	.615			
3	1	1			
4	1.524	1.881			
5	5.203	11.862			
6	9.539	29.456			
7	19.191	84.07			
0	.387	16/ 01			
	Edit Ins	s Sort	Size	Make	Stats

Make a scatterplot of y versus x. Press and select Autoscale to see the scatterplot and confirm there is a curved pattern.



• To see whether an exponential model fits the original data, define S1 to use C1 and LN(C2).

Statistics 2Var	Symbolic View	14:23		
√ S1: C1	LN(C2)	ĺ		
Type1: Linear 🔹 🔻				
Fit1: M*X+B				
S2:		•		
Type2: Linear				
Fit2: M*X+B				
S3:				
Enter function				
Edit √ X	Fit Show	Eval		

• Again, use the Autoscale option and look for linearity.



 To see whether a power model fits the original data, define S1 to use LN(C1) and LN(C2) and look for linearity.

Statistics 2V	ar Symbolic View 🛛 👫
<mark>√ 51:</mark> LN(C1)	LN(C2)
Type1: Linear	τ
Fit1: M*X+B	
S2:	
Type2: Linear	T
Fit2: M*X+B	
S3:	
Enter function	
Edit √ X	Fit Show Eval
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•	
•	
S1:5 X:1.6492353823	Y:2.4733400134 Menu

• If a linear pattern is present, calculate the equation of the least-squares regression line. Tap Menu and Fit•.

 Construct a residual plot to look for any departures from the linear pattern. Press
to go to the Home view and store RESID(S1) in C3.

Statistics 2Var	14:39
Resid(ST) CS	
.00065111858,.000086541052,0	00254444

• Press enter the Symbolic view. Uncheck S1 and define S2 to use C1 and C3.

Statistics 2Var Sy	mbolic View 14:41		
✓ ^{51:} LN(C1)	LN(C2)		
Type1: Linear	٣		
Fit1: 1.4998609856*X+.00025444423398			
√ s2: C1	C3		
Type2: Linear	T		
Fit2: M*X+B			
S3:			
Choose fit type			
Choose √	Fit•		

• Again, use the Autoscale option.



To make a prediction for a specific value of the explanatory variable, compute log *x* or ln *x*, if appropriate. Then use PredY(k) to obtain the predicted value of log *y* or ln *y*. To get the predicted value of *y*, use 10^Ans or *e*^Ans to undo the logarithmic transformation. Here's our prediction of the period of revolution for Eris, which is at a distance of 102.15 AU from the sun:

• Press end to go to the Symbolic view. Uncheck S2 and check S1 (S2 has a fit that we do not want to use!)

Statistics 2Var Syr	nbolic View 14	:54	
√ ^{51:} LN(C1)	LN(C2)		
Type1: Linear 🔹			
Fit1: 1.4998609856*X+.00025444423398			
S2: C1 C3			
Type2: Linear			
Fit2: 8.26850386455E-6*X-9.844756651			
S3:			
Enter independent column			
Edit √ C	Fit• Show Ev	al	

From the Home view, press , tap
App, tap Statistic 2Var, and select PredY

Statist	12:03		
App Functions	1 PredX		
Statistics 2Var	>	2PredY	
Function	>	≅Resid	
TC3-1	>	4Do2VStats	
TC1-3	>	5 SetDepend	
TC2-2	>	6 SetIndep	
ROSE_4_Chaoyang	>	7 CHECK	
TC2-2B		8 UNCHECK	
DataStreamer		9ISCHECK	
Math CAS App		Catlg	OK

• Complete the command PredY(LN(102.15)). Then enter e^Ans to find the period of revolution of Eris.

Statistics	2Var 14:55
PredY(LN(102.15))	6.93927478402
Ans e	1032.02150502
Sto 🕨	

Note: Press Shiff e^{LN} for e^ and Shiff e^{LN} for Ans