

Exponential Regression on the TI-92/Voyage 200 from the HOME Screen.

References: Essential Mathematical Methods, Units 1 & 2: Chapter 13. Exponential Functions and Logarithms
Essential Mathematical Methods 3 & 4: Chapter 5. Exponential and Logarithmic Functions
Chapter 3 Variation; Section 3.3 Fitting Data.

Technology functions:

Basic Screens of calculator; ExpReg; ShowStat; Regeq(x); NewPlot

Introduction

Exponential regression on the TI 92+/Voyage 200 uses the formula $y = a \times b^x$, where the parameters are 'a' and 'b'. The above courses generally require the base, 'b', to be the number 10 or e . This can be achieved by a simple formula change, outlined below.

- Exponential regression is given as $y = a \times b^x$.

To change the base from 'b' to 'e'

$$y = a \times b^x$$

$$\frac{y}{a} = b^x$$

$$\log_b\left(\frac{y}{a}\right) = x$$

change base

$$x = \frac{\log_e\left(\frac{y}{a}\right)}{\log_e b}$$

$$(x \times \log_e b) = \log_e\left(\frac{y}{a}\right)$$

$$\frac{y}{a} = e^{(\log_e b \times x)}$$

$$y = a \times e^{(\log_e b \times x)}$$

$y = a \times b^x$ $y = a \times e^{\log_e b \times x}$

Note: For base '10', substitute '10' for 'e'.

Example of Exponential Regression on the TI 92+/Voyage 200

Find the exponential regression equation for the following data.

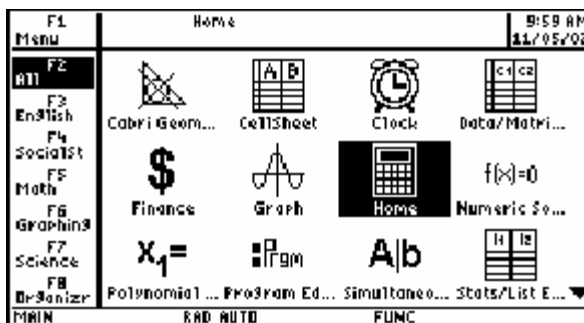
x	1	2	3	4
y	2	4	6.5	10

Home screen

‘State-up’ view on Voyage 200 only.

Highlight **Home**; press **ENTER**

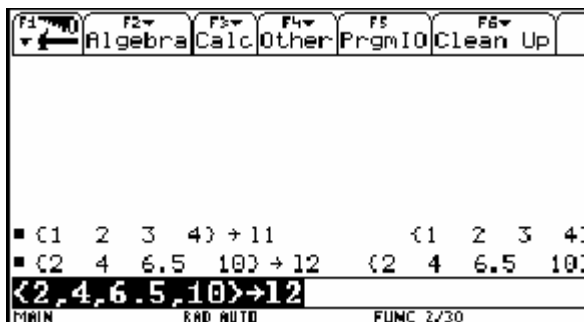
Note: TI 92+ boots up on the **Home** screen



Enter the data into list 1 (L1) and list 2 (L2)

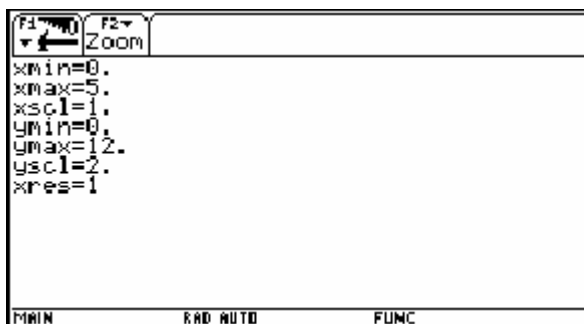
2nd **[]** 1, 2, 3, 4 **2nd** **[)]** **STO▶** 1,1 **ENTER**

2nd **[]** 2, 4, 6.5, 10 **2nd** **[)]** **STO▶** 1,2 **ENTER**



◆ **[WINDOW]**

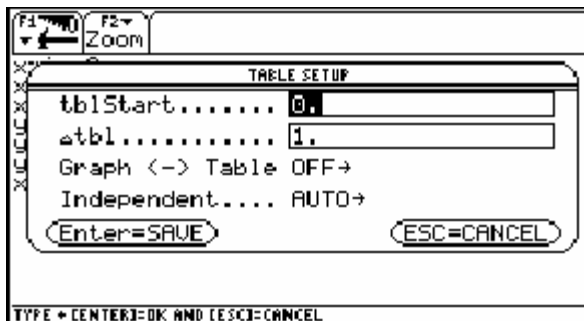
Set window as shown



◆ **[TblSet]**

Set TBLSET as shown

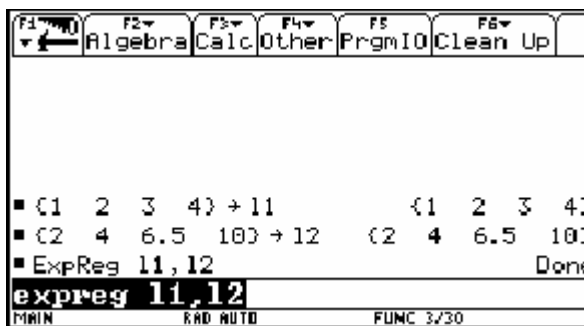
Press **ENTER** **ENTER**



Return to **Home screen**

ExpReg *space* 11,12 **[ENTER]**

Note: This calculates the regression equation



Show Stat **[ENTER]**

Note: This displays the values of a and b.

The regression equation is:

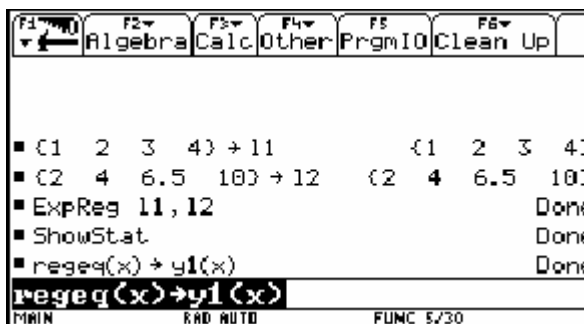
$$y = 1.264911 \times 1.701282^x$$



Press **[ENTER]** to return to **Home screen**

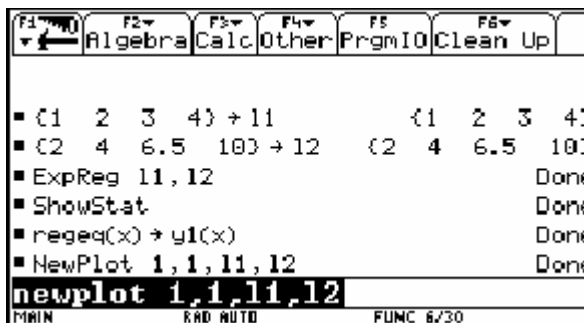
Regeq(x) **[STO▶]** y1(x) **[ENTER]**

Note: Stores regression equation into y1

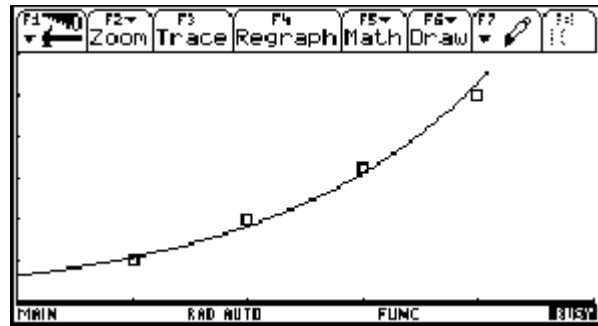


NewPlot *space* 1, 1, 11,12 **[ENTER]**

Note: NewPlot sets up a scatter plot of original data. The first '1' specifies a scatter plot; the second '1' specifies each data point to be displayed as a 'box'.



◆ [GRAPH] displays the *scatter plot* and *graph* of the regression equation



Changing base of regression equation

$$y = 1.264911 \times 1.701282^x$$

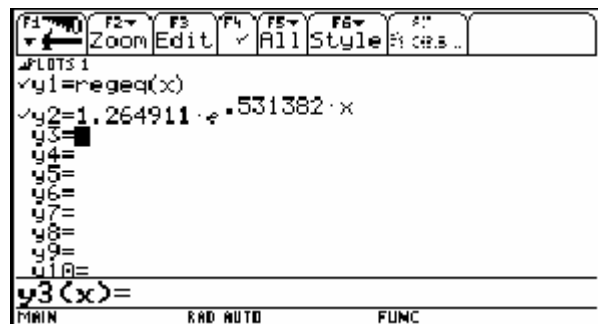
$$y = 1.264911 \times e^{\log_e 1.701282 \times x}$$

$$y = 1.264911 \times e^{0.531382x}$$

Check that this regression equation with base 'e' is the same equation

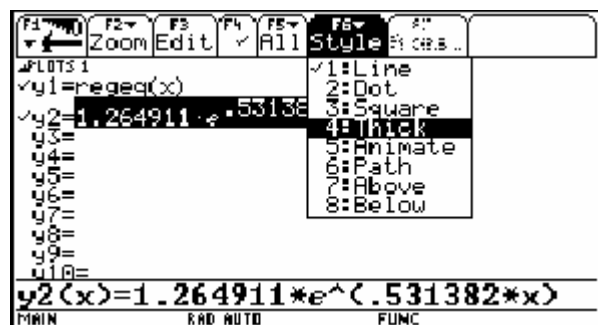
◆ [Y=]

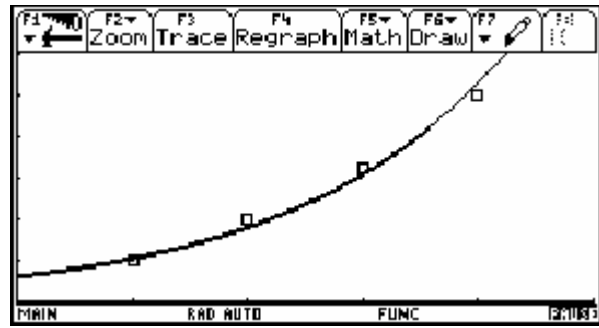
Enter equation into y2, as shown



Draw as a **thick** line to highlight graph of y2

[F6] [4] [ENTER]





x	y1	y2			
0.	1.2649	1.2649			
1.	2.152	2.152			
2.	3.6611	3.6611			
3.	6.2286	6.2286			
4.	10.597	10.597			
5.	18.028	18.028			
6.	30.67	30.67			
7.	52.179	52.179			

x=0.

The calculator screen also shows function keys at the top: F1 (Left Arrow), F2 (Setup), F3 (Cell), F4 (Rnds), F5 (Del), F6 (Ins), and F7 (Pow). The bottom of the screen shows 'MIN', 'RAD AUTO', and 'FUNC'.