

Math1231 Lecture 2 Using TI-84(plus)

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Scatter Plots and Models on the TI-84

Example 1. The following table gives the number (in thousands) of laptops sold per month after it is released. Show work and give **units** for each answer.

# of months after it released	2	4	6	8	10	12	14
# laptops (thousands per month)	580	560	540	330	200	140	120

(a). Let x stand for the number of months after the laptops released, and let $f(x)$ stand for the number of laptops (in thousands) sold per month. Fit **the best model** to the data. Round all coefficients to 3 decimal places.

Using TI-84:(ClassPacket p.41)

Using TI-84:(ClassPacket p.41)

Press **STAT**, get graph1, (then press **ENTER** get graph2)

```
EDIT  CALC TESTS
1:Edit...
2:SortA(
3:SortD(
4:ClrList
5:SetUPEditor
```

L1	L2	L3	1
████████	-----	-----	
L1(1) =			

Using TI-84:(ClassPacket p.41)

Press **STAT**, get graph1, (then press **ENTER** get graph2)

```

▶▶▶▶▶ CALC TESTS
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor

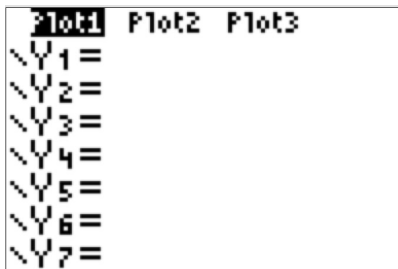
```

L1	L2	L3	1
-----	-----	-----	
L1(1) =			

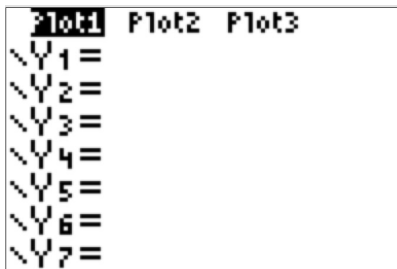
Enter data in **L1** and **L2**.

L1	L2	L3	2
2	580	-----	
4	560		
6	540		
8	330		
10	200		
12	140		
14	120		
L2(7) = 120			

Press **Y=**. Press **Clear**.



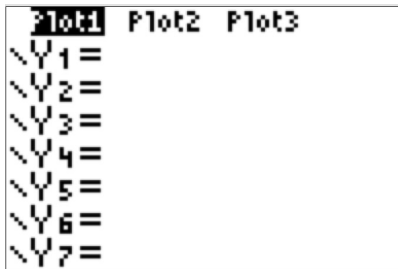
Press **Y=**. Press **Clear**.



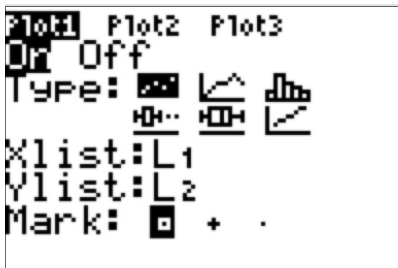
Press **2nd**. Press **Y=**. (This gives STAT PLOT)



Press **Y=**. Press **Clear**.



Press **2nd**. Press **Y=**. (This gives STAT PLOT)



Make sure that **PLOT1** is **ON**. Make sure **X List** is set to **L1** and **Y List** is set to **L2**.

Press ZOOM.

```
ZOOM MEMORY  
1: ZBox  
2: Zoom In  
3: Zoom Out  
4: ZDecimal  
5: ZSquare  
6: ZStandard  
7↓ZTrig
```

Press ZOOM.

```
ZOOM MEMORY  
1: ZBox  
2: Zoom In  
3: Zoom Out  
4: ZDecimal  
5: ZSquare  
6: ZStandard  
7↓ ZTrig
```

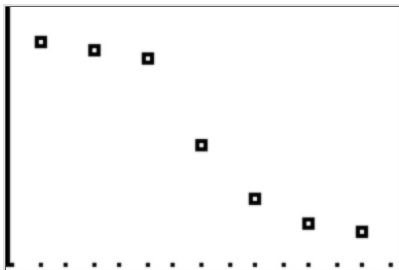
```
ZOOM MEMORY  
4↑ ZDecimal  
5: ZSquare  
6: ZStandard  
7: ZTrig  
8: ZInteger  
9: ZoomStat  
8↓ ZFit
```

Press ZOOM.

```
ZOOM MEMORY
1: ZBox
2: Zoom In
3: Zoom Out
4: ZDecimal
5: ZSquare
6: ZStandard
7↓ ZTrig
```

```
ZOOM MEMORY
4↑ ZDecimal
5: ZSquare
6: ZStandard
7: ZTrig
8: ZInteger
9: ZoomStat
8 ZZoomFit
```

Press 9.

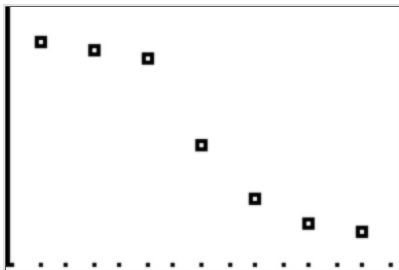


Press ZOOM.

```
ZOOM MEMORY
1: ZBox
2: Zoom In
3: Zoom Out
4: ZDecimal
5: ZSquare
6: ZStandard
7↓ ZTrig
```

```
ZOOM MEMORY
4↑ ZDecimal
5: ZSquare
6: ZStandard
7: ZTrig
8: ZInteger
9: ZoomStat
9↓ ZoomFit
```

Press 9.



Logistic model

Press **STAT**, (graph1), then Press → (**right** arrow button) (graph2)

```

[2nd] [7] CALC TESTS
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor

```

```

EDIT [2nd] [7] TESTS
1: 1-Var Stats
2: 2-Var Stats
3: Med-Med
4: LinReg(ax+b)
5: QuadReg
6: CubicReg
7: ↓ QuartReg

```

Press **STAT**, (graph1), then Press \rightarrow (**right arrow button**) (graph2)

```
EDIT STAT TESTS
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor
```

```
EDIT STAT TESTS
1: 1-Var Stats
2: 2-Var Stats
3: Med-Med
4: LinReg(ax+b)
5: QuadReg
6: CubicReg
7: QuartReg
```

```
EDIT STAT TESTS
7: QuartReg
8: LinReg(a+bx)
9: LnReg
0: ExpReg
A: PwrReg
B: Logistic
C: SinReg
```

Press **STAT**, (graph1), then Press \rightarrow (**right arrow button**) (graph2)

```
EDIT STAT TESTS
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor
```

```
EDIT STAT TESTS
1: 1-Var Stats
2: 2-Var Stats
3: Med-Med
4: LinReg(ax+b)
5: QuadReg
6: CubicReg
7:  $\downarrow$ QuartReg
```

```
EDIT STAT TESTS
7:  $\uparrow$ QuartReg
8: LinReg(a+bx)
9: LnReg
0: ExpReg
A: PwrReg
B: Logistic
C:  $\downarrow$ SinReg
```

```
Logistic
Xlist: L1
Ylist: L2
FreqList:
Store RegEQ:
Calculate
```

Press **STAT**, (graph1), then Press \rightarrow (**right arrow button**) (graph2)

```
EDIT STAT TESTS
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor
```

```
EDIT STAT TESTS
1: 1-Var Stats
2: 2-Var Stats
3: Med-Med
4: LinReg(ax+b)
5: QuadReg
6: CubicReg
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```

```
EDIT STAT TESTS
7: QuartReg
8: LinReg(a+bx)
9: LnReg
0: ExpReg
A: PwrReg
B: Logistic
C: SinReg
```

```
Logistic
Xlist: L1
Ylist: L2
FreqList:
Store RegEQ:
Calculate
```

For TI-83(plus): Logistic (L1,L2,Y1)

Press **STAT**, (graph1), then Press \rightarrow (**right arrow button**) (graph2)

```
EDIT STAT TESTS
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor
```

```
EDIT STAT TESTS
1: 1-Var Stats
2: 2-Var Stats
3: Med-Med
4: LinReg(ax+b)
5: QuadReg
6: CubicReg
7: QuartReg
```

```
EDIT STAT TESTS
7: QuartReg
8: LinReg(a+bx)
9: LnReg
0: ExpReg
A: PwrReg
B: Logistic
C: SinReg
```

```
Logistic
Xlist: L1
Ylist: L2
FreqList:
Store RegEQ:
Calculate
```

For TI-83(plus): Logistic (L1,L2,Y1)

4 Linear, 5 Quadratic, 6 Cubic, 0 Exponential, B **Logistic model**

Press **VARS**, (graph1) then press → (right arrow) (**Y-VARS**)(graph2)

```
VARS Y-VARS
1: Window...
2: Zoom...
3: GDB...
4: Picture...
5: Statistics...
6: Table...
7: String...
```

```
VARS Y-VARS
1: Function...
2: Parametric...
3: Polar...
4: On/Off...
```

Press **VARS**, (graph1) then press → (**right arrow**) (**Y-VARS**)(graph2)

```
VARS Y-VARS
1: Window...
2: Zoom...
3: GDB...
4: Picture...
5: Statistics...
6: Table...
7: String...
```

```
VARS Y-VARS
1: Function...
2: Parametric...
3: Polar...
4: On/Off...
```

Press **ENTER**,

```
FUNCTION
1: Y1
2: Y2
3: Y3
4: Y4
5: Y5
6: Y6
7: ↓Y7
```

Press **VARS**, (graph1) then press → (**right arrow**) (**Y-VARS**)(graph2)

```
VARS Y-VARS
1: Window...
2: Zoom...
3: GDB...
4: Picture...
5: Statistics...
6: Table...
7: String...
```

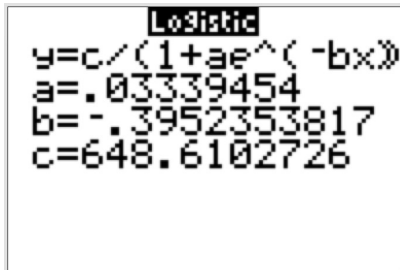
```
VARS Y-VARS
1: Function...
2: Parametric...
3: Polar...
4: On/Off...
```

Press **ENTER**,

```
FUNCTION
1: Y1
2: Y2
3: Y3
4: Y4
5: Y5
6: Y6
7: ↓Y7
```

```
Logistic
Xlist: L1
Ylist: L2
FreqList:
Store RegEQ: Y1
Calculate
```

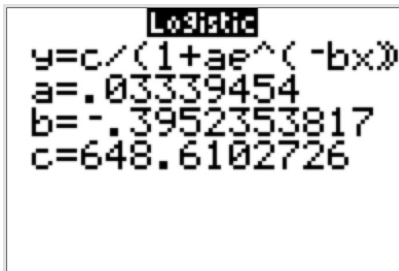
The model will appear on screen, and the formula for the model will be in the Y1 spot under y=.



The image shows a calculator screen with a black background and white text. At the top, the word "Logistic" is displayed in a bold, black font. Below it, the logistic regression equation is shown: $y = c / (1 + ae^{(-bx)})$. Underneath the equation, the values for the parameters are listed: $a = .03339454$, $b = -.3952353817$, and $c = 648.6102726$.

Logistic
 $y = c / (1 + ae^{(-bx)})$
 $a = .03339454$
 $b = -.3952353817$
 $c = 648.6102726$

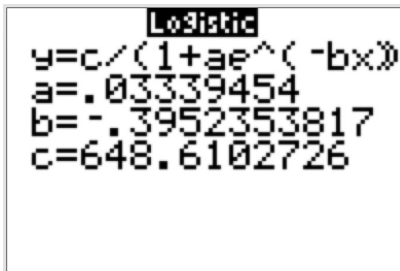
The model will appear on screen, and the formula for the model will be in the Y1 spot under y=.



Logistic
 $y=c/(1+ae^{(-bx)})$
a=.03339454
b=-.3952353817
c=648.6102726

Answer to Question (a):

The model will appear on screen, and the formula for the model will be in the Y1 spot under y=.



The image shows a calculator screen with the following text:

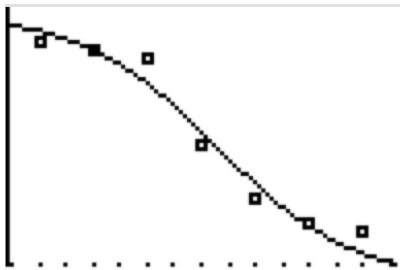
```
Logistic
y=c/(1+ae^(-bx))
a=.03339454
b=-.3952353817
c=648.6102726
```

Answer to Question (a):

$$f(x) = \frac{c}{1 + a \cdot e^{-bx}} \text{ thousands per month.}$$

$$a = 0.033, b = -0.395, c = 648.610$$

Press ZOOM, press 9 to see how the model fit the data.(not for the question)

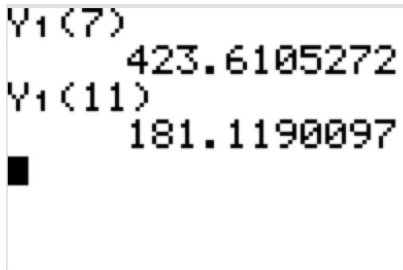


(b). According to the model in part (a), how many laptops are sold in the 7 months? in the 11 months? Round to 1 laptop.

(b). According to the model in part (a), how many laptops are sold in the 7 months? in the 11 months? Round to 1 laptop.

```
Y1(7)
      423.6105272
Y1(11)
      181.1190097
■
```

(b). According to the model in part (a), how many laptops are sold in the 7 months? in the 11 months? Round to 1 laptop.



A calculator display showing two function evaluations. The first line shows $Y_1(7)$ followed by the value 423.6105272. The second line shows $Y_1(11)$ followed by the value 181.1190097. A small black square cursor is visible on the line below the second evaluation.

Input	Output
$Y_1(7)$	423.6105272
$Y_1(11)$	181.1190097

Answer:

$f(7) = 423.611$ thousands per month.

$f(11) = 181.119$ thousands per month.

(c). Use the model in part (a) to approximate the *average rate of change* of laptops sold per month between the 7 months and the 11 months.

(c). Use the model in part (a) to approximate the *average rate of change* of laptops sold per month between the 7 months and the 11 months.

Answer:

$$\frac{f(11) - f(7)}{11 - 7} = \frac{181.119 - 413.611}{4} = -60.623$$

Youtube link for these two examples

For Example 1:

Step A, <https://www.youtube.com/watch?v=7bVsqdZuDvo>

Step B, <https://www.youtube.com/watch?v=tgU4BiZsKyQ>

Step C, https://www.youtube.com/watch?v=_nSuDd905bs

Step D, <https://www.youtube.com/watch?v=F0tEorWgSYo>

For Example 2:

Step A, <https://www.youtube.com/watch?v=zS4WgTx4LRU>

Step B, https://www.youtube.com/watch?v=1JG1VJRO_x8

Step C, <https://www.youtube.com/watch?v=8rQu9MR7lps>

Example 2. The following data shows a company spending on marketing in these years. Show work and give **units** for each answer.

year	2008	2009	2010	2011	2012	2013	2014
Spend(million\$)	23.07	24.47	26.21	30.36	38.31	46.38	57.96

(a). Let x stand for the number of years since 2007, and let $g(x)$ stand for the money spending on market in millions. Fit **the best model** to the data. Round all coefficients to 3 decimal places.

Example 2. The following data shows a company spending on marketing in these years. Show work and give **units** for each answer.

year	2008	2009	2010	2011	2012	2013	2014
Spend(million\$)	23.07	24.47	26.21	30.36	38.31	46.38	57.96

(a). Let x stand for the number of years since 2007, and let $g(x)$ stand for the money spending on market in millions. Fit **the best model** to the data. Round all coefficients to 3 decimal places.

Entering data on the TI84: Press **STAT** then press **ENTER** (or press 1)

```

2011  CALC TESTS
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor

```

L1	L2	L3	1
-----	-----	-----	
L1(1) =			

Enter data in **L1** and **L2**. Press **Y=**. Press **Clear**.

L1	L2	L3	2
1	23.07	-----	
2	24.47		
3	26.21		
4	30.36		
5	38.31		
6	46.38		
7	57.96		
L2(7) = 57.96			

```

21001 Plot2 Plot3
\Y1=
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
  
```

Press **2nd**. Press **Y=**. (This gives STAT PLOT) then **ENTER** (or 1).

```

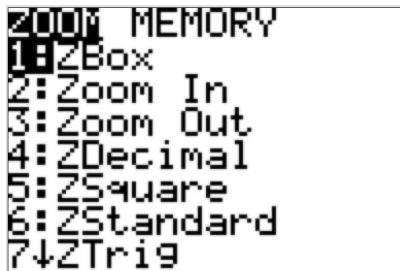
STAT PLOTS
1:Plot1...On
  [ ] L1 L2
2:Plot2...Off
  [ ] L1 L2
3:Plot3...Off
  [ ] L1 L2
4↓PlotsOff
  
```

```

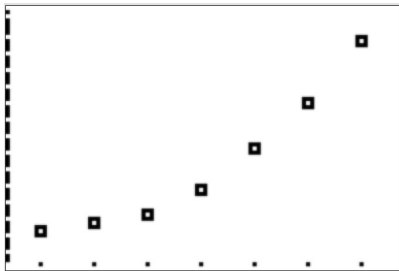
21001 Plot2 Plot3
On Off
Type: [ ] [ ] [ ]
      [ ] [ ] [ ]
Xlist:L1
Ylist:L2
Mark: [ ] + .
  
```

Make sure that **PLOT1** is **ON**. Make sure **X List** is set to **L1** and **Y List** is set to **L2**.

Press **ZOOM**.



Press **9**.



Exponential model

Press **STAT** then Press → (**right** arrow button)

```
EDIT STAT TESTS
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor
```

```
EDIT STAT TESTS
1: 1-Var Stats
2: 2-Var Stats
3: Med-Med
4: LinReg(ax+b)
5: QuadReg
6: CubicReg
7: QuartReg
```

Find 0 ExpReg

```
EDIT STAT TESTS
7: QuartReg
8: LinReg(a+bx)
9: LnReg
0: ExpReg
A: PwrReg
B: Logistic
C: SinReg
```

```
ExpReg
Xlist: L1
Ylist: L2
FreqList:
Store RegEQ:
Calculate
```

For TI-83(plus) calculator: ExpReg (L1,L2,Y1)

Press **VARS** then press → (right arrow button) (**Y-VARS**)

```
VARS Y-VARS
1: Window...
2: Zoom...
3: GDB...
4: Picture...
5: Statistics...
6: Table...
7: String...
```

```
VARS Y-VARS
1: Function...
2: Parametric...
3: Polar...
4: On/Off...
```

Press **ENTER**,

```
FUNCTION
1: Y1
2: Y2
3: Y3
4: Y4
5: Y5
6: Y6
7: ↓Y7
```

```
Expr3
Xlist: L1
Ylist: L2
FreqList:
Store RegEQ: Y1
Calculate
```

The model will appear on screen, and the formula for the model will be in the Y1 spot under y=.

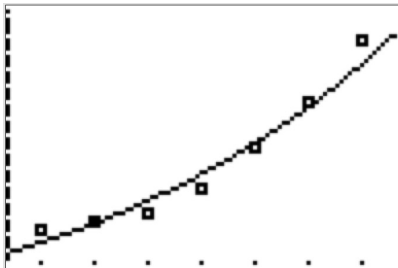
```
Expr3
y=a*b^x
a=17.7520559
b=1.171085512
```

Answer to Question (a):

$g(x) = a \cdot b^x$ million dollars.

$a = 17.752$, $b = 1.171$

Press ZOOM, press 9 to see how this function fit. (Not for question)



(b). Use the model in part (a) to estimate the company spending on market in millions in 2015.

$$Y_1(8) = 62.79969317$$

Answer:

$$g(8) = 62.800 \text{ million dollars.}$$