TI Technology Guide for World Population Milestones

TI-83 Plus and TI-84 Plus Families

Creating Lists of Data, Using the Regression Capabilities of the Calculator, Predicting Using the Regression Model, Displaying the Graph, and Using the nDeriv Feature to Graph the Derivative of a Function.

To enter the data from the Snapshot in the activity, press STAT and select 1:Edit to access the List Editor window. Be sure to clear any existing data in the lists by highlighting the list name and pressing CLEAR ENTER. If you see a list other than L1 through L6, press and select STAT 5:SetUpEditor ENTER and then follow the above instructions.

Move the cursor to the first data position in L1. Enter data from the activity that represent the year 1950 through 2050. Move the cursor to the first data position in L2 and enter the corresponding population for that year.

Access the STAT PLOTS menu screen by pressing 2nd Y=. Select (press ENTER or the number 1) 1:Plot1 to get the screen shown. Notice that Plot1 and On are highlighted. To turn on or off any plot, place the cursor over the name, press ENTER, then select either On or Off, and press ENTER again. This process acts like a toggle switch to turn the plots on and off the graphing display. Plot1 should have the same settings as shown at the right.

TI Technology Guide for World Population Milestones

TI-83 Plus and TI-84 Plus Families

Press $\boxed{\text{ZOOM}}$ $\boxed{9}$. This will select 9:ZoomStat which will automatically set the viewing window and display all the data points of the scatter plot.

```
WINDOW
 Xmin=1940
 Xmax=2060
 Xscl=1
 Ymin=1.412
 Ymax=9.988
 Yscl=1
 Xres=1
```
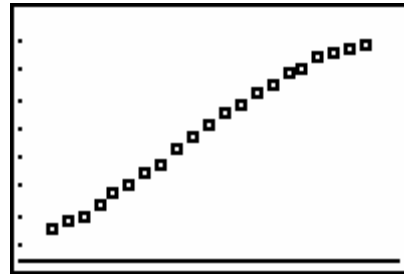
To use the regression capabilities, press $\boxed{\text{STAT}}\boxed{\triangleright}$ to access the CALC menu. Select B:Logistic and enter $\boxed{\text{2nd}}\boxed{\text{L1}}\boxed{,}\boxed{\text{2nd}}\boxed{\text{L2}}\boxed{,}$ press $\boxed{\text{VARS}}$ $\boxed{\triangleright}\boxed{\text{ENTER}}\boxed{\text{ENTER}}$.

```
Logistic L1,L2,Y
1
```

Press $\boxed{\text{ENTER}}$ to have the handheld calculate the logistic function that models the data set.
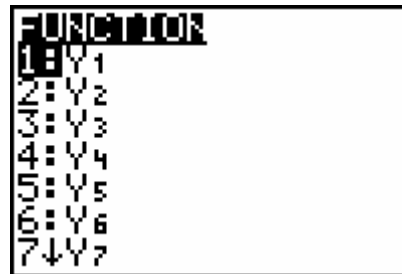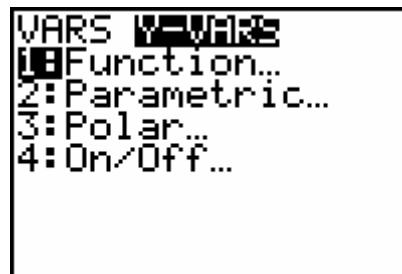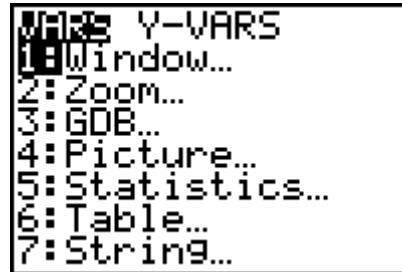
```
Logistic
 y=c/(1+ae^(-bx)
 a=6.1689158E26
 b=.0310222571
 c=10.32879715
```
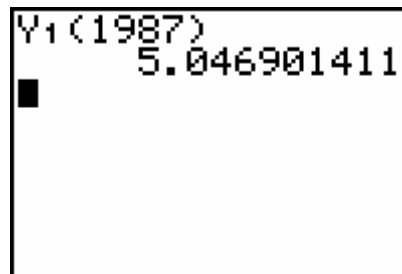
TI Technology Guide for World Population Milestones

TI-83 Plus and TI-84 Plus Families

The predicted population for the world in 1987 can be calculated by evaluating the logistic equation for that year. Press $\boxed{\text{VARS}}$, $\boxed{\blacktriangleright}$, $\boxed{\text{ENTER}}$, $\boxed{\text{ENTER}}$.

```
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…
```

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

Enter the following $\boxed{(}\boxed{1}\boxed{9}\boxed{8}\boxed{7}\boxed{)}$ and press $\boxed{\text{ENTER}}$.

```
Y1(1987)
        5.046901411
■
```
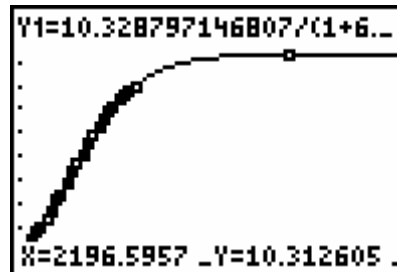
TI Technology Guide for World Population Milestones

TI-83 Plus and TI-84 Plus Families

To explore the behavior of this graph press WINDOW and make the changes shown at the right.

```
WINDOW
 Xmin=1940
 Xmax=2300
 Xscl=1
 Ymin=1.412
 Ymax=12
 Yscl=1
 Xres=1
```

Press TRACE to display the scatter plot and the logistic model. Press ▲ to move the cursor from the scatter plot to the logistic model. Continue to press ▶ to move the cursor along the logistic model. The limiting behavior of the logistic model can be seen at the bottom of the screen.

```
Y1=10.328797146807/(1+6._

X=2196.5957   Y=10.312605
```

Press Y= ◀ ENTER. This will deselect Y1 so that it will not graph. Move the cursor to Y2. Press MATH ▲ ▲ ▲ ENTER to select 8:nDeriv(. Press VARS ▶ 1 1 , X,T,Θ,n , X,T,Θ,n).

```
Plot1 Plot2 Plot3
\Y1=10.328797146
807/(1+6.1689157
890196ε26e^(-.03
10222571293eX))
\Y2 = nDeriv(Y1,X,
X)
\Y3=
```

Press WINDOW and make the changes shown at the right.

```
WINDOW
 Xmin=1940
 Xmax=2300
 Xscl=1
 Ymin=0
 Ymax=.1
 Yscl=1
 Xres=1
```
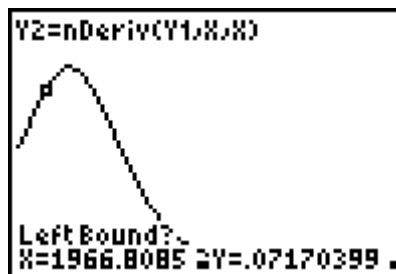
Press 2nd [CALC] and select 4:maximum.

```
CALCULATE
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
7:∫f(x)dx
```
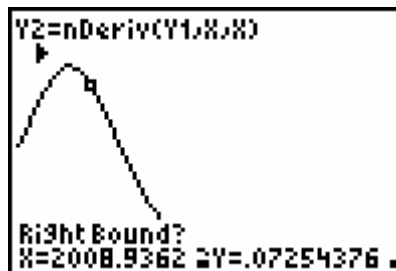
TI Technology Guide for World Population Milestones

TI-83 Plus and TI-84 Plus Families

Use the arrow keys to move the cursor to the left side of the maximum point on the graph. Press ENTER.

Move the cursor to the right side of the maximum point on the graph and press ENTER.

Press ENTER again since there is only one maximum point on the graph. If there were more than one point you would move the cursor closer to the point you want to explore.
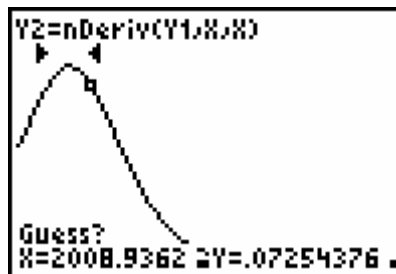
The values at the bottom of the screen represent the year when the change in the population was the greatest.