

Enrichment

Objective 3.03

Making predictions using the line of best fit

Find the line of best fit for the data, and predict sales in the year 2020.

Retail Department Store Sales (billions of dollars)

Year	1980	1985	1990	1994	1995	1996	1997	1998
Sales	86	126	166	217	231	245	261	279

Step 1: STAT, EDIT Enter in data in L1(year) and L2(sales).

L1	L2	L3	1
1980	86	-----	
1985	126		
1990	166		
1994	217		
1995	231		
1996	245		
1997	261		

L1(1)=1980

Step 2: STAT—CALC—4 do not press enter yet

Step 3: Type in L1,L2,Y1 `LinReg(ax+b) L1,`
`L2,Y1`

***L1 is (2nd 1), L2 is (2nd 2), Y1 is VARS, Y-VARS, FUNCTION, Y1,
Enter***

Press ENTER `LinReg`
`y=ax+b`
`a=10.60174292`
`b=-20915.97168`



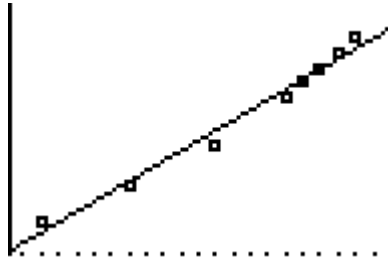
This gives you your line of best fit: $y = 10.6x - 772.66$

Let's look at the graph:

Step 4: Go to Y= arrow up and highlight the PLOT

```
Plot1 Plot2 Plot3
\Y1=10.601742919
39X+ -20915.97167
756
\Y2=
\Y3=
\Y4=
\Y5=
```

Step 5: ZOOM 9 This is a scatter plot of your data, as well as the line of best fit.



Step 6: Making Predictions: You can make predictions by pressing 2nd window, and put in the value you are looking for (x value only) where it says TblStart. Then go to 2nd Graph for your table.

Predict the year 2000:

```
TABLE SETUP
TblStart=2000
ΔTbl=1
Indent: Auto Ask
Depend: Auto Ask
```

X	Y1
2000	287.51
2001	298.12
2002	308.72
2003	319.32
2004	329.92
2005	340.52
2006	351.12

X=2000

A good prediction for the year 2000 is 287.51 billion dollars in retail sales.

If you wanted to predict the year there would be close to 400 billion dollars in sales, scroll down the table and see when the Y value reaches 400.

X	Y1
2005	340.52
2006	351.12
2007	361.72
2008	372.32
2009	382.92
2010	393.52
2011	404.12

X=2011

Between 2010 and 2011 sales will reach 400 billion dollars.

You try:

1. The table shows the relationship between calories and fat in various fast-food hamburgers.

Calories	Fat (g)
720	46
530	30
510	27
500	26
305	13
410	20
440	25
320	13
598	26

Source: The Fat Counter

- a. Find the line of best fit.
- b. How much fat would a 600 calorie hamburger have?
- c. How many calories would a hamburger with 50 grams of fat have?

2.

Height and Weights of NC All-State Football Players			
Height (in)	Weight	Height in)	Weight
72	265	70	218
70	243	73	203
73	287	75	261
76	265	78	287

*use both height columns for L1, and both weight columns for L2

- a. Write the equation of the line of best fit for this data:
- b. Using your table, predict the weight of a player who is 68 inches tall (to the nearest pound).
- c. Predict the height of a player who weighs 300 pounds:

Answers: 1 a. $y = 0.071x - 9.27$ b. 33.6 c. 830 (you may want to predict values of x instead of scrolling the whole time, and then check your table for y)

2. a. $y = 6.14x - 196.97$ b. 221 pounds c. 81 inches