AP Stats
Chap 8
Investigative Task Name ______________________________ Pd __________

The Impressive Growth of Krispy Kreme DOUGHNUTS®

Vernon Rudolph bought a secret yeast-raised doughnut recipe from a French chef from New Orleans, rented a building in Winston-Salem, North Carolina, and began selling Krispy Kreme doughnuts on July 13, 1937 to local grocery stores. People soon began stopping by to ask if they could buy hot doughnuts, so he cut a hole in the wall and started selling Hot Original Glazed donuts directly to customers. Since then, business has exploded.

The table below shows the number of new Krispy Kreme stores opened each year from 1985 through 2005. **(This is <u>one</u> set of data, <u>not</u> two.)**

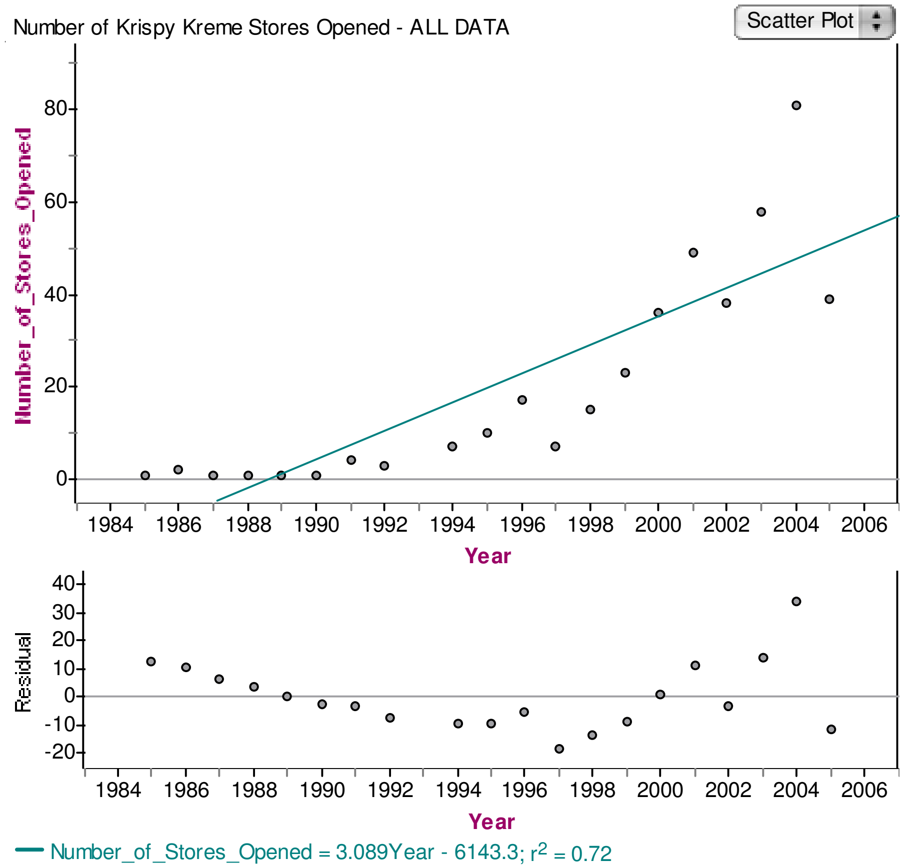
Year	# of Stores Opened
1985	1
1986	2
1987	1
1988	1
1989	1
1990	1
1991	4
1992	3
1994	7
1995	10

Year	# of Stores Opened
1996	17
1997	7
1998	15
1999	23
2000	36
2001	49
2002	38
2003	58
2004	81
2005	39

✓ Plot the data and attach your displays.

✓ Respond to each of the following:
- Discuss the original scatterplot (with *all* the data included).
- Justify your decision to either use all the data or to eliminate some of it.
- Create an appropriate model for the data.
- Discuss the slope and intercept of the model, in correct context.
- Estimate the number of stores that opened in 1993. Express any caution you may have with this estimate.
- Predict the number of stores that will open in 2009. Express any caution you may have with this prediction.

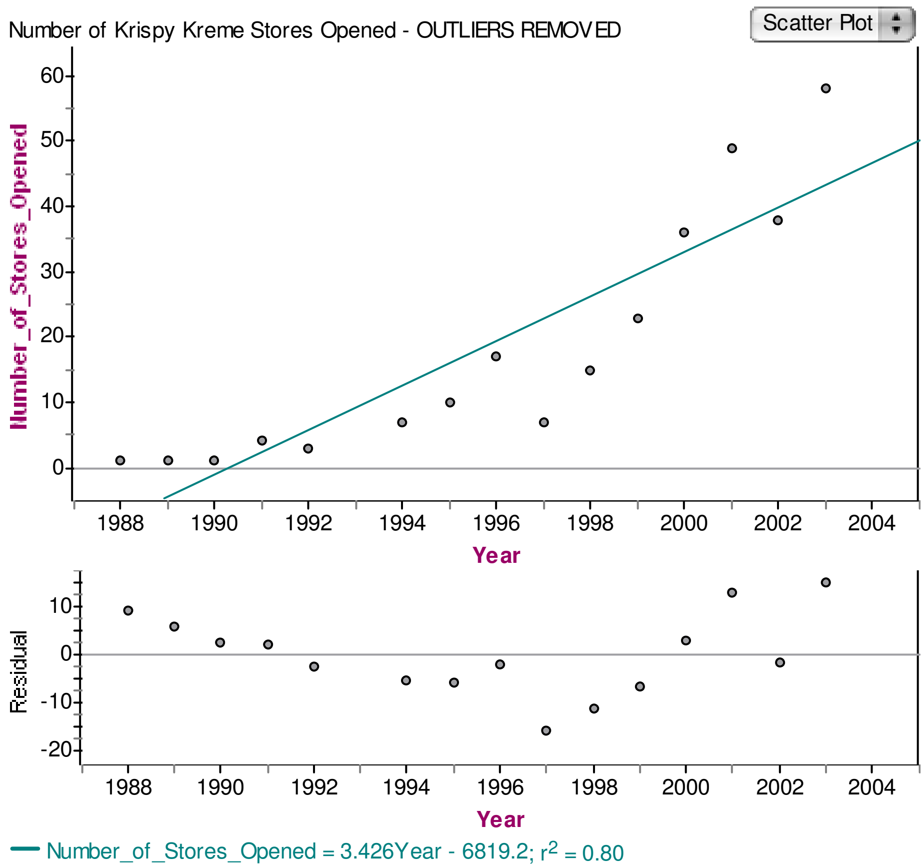
Display with <u>all</u> the data included. **BAD IDEA. ☹**



$$\widehat{\text{Number of Stores Opened}} = -6143.3 + 3.089\left(\text{Year}\right)$$

$$R^2 = 0.72 \qquad r = 0.85$$

Display with four outliers (1985, 1986, 1987, 2004) removed. **SLIGHTLY BETTER IDEA.**

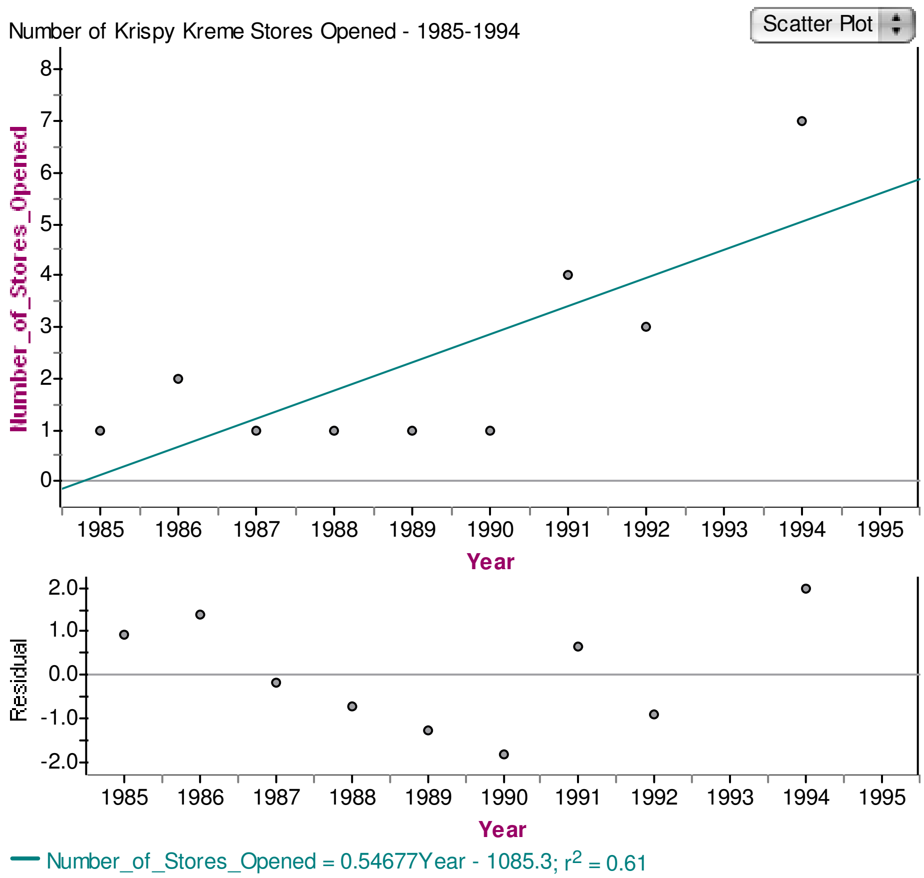


$$\widehat{\text{Number of Stores Opened}} = -6819 + 3.426(\text{Year})$$

$$R^2 = 0.80 \quad r = 0.89$$

Display of 1985 – 1994 data.

BEST IDEA FOR 1993 ESTIMATE. ☺



$$\widehat{\text{Number of Stores Opened}} = -1085 + .54677(\text{Year})$$

$$R^2 = 0.61 \quad r = 0.78$$

The slope of the model, 0.55, reflects that for each one year time passes, an approximate 0.55 new stores will have opened.

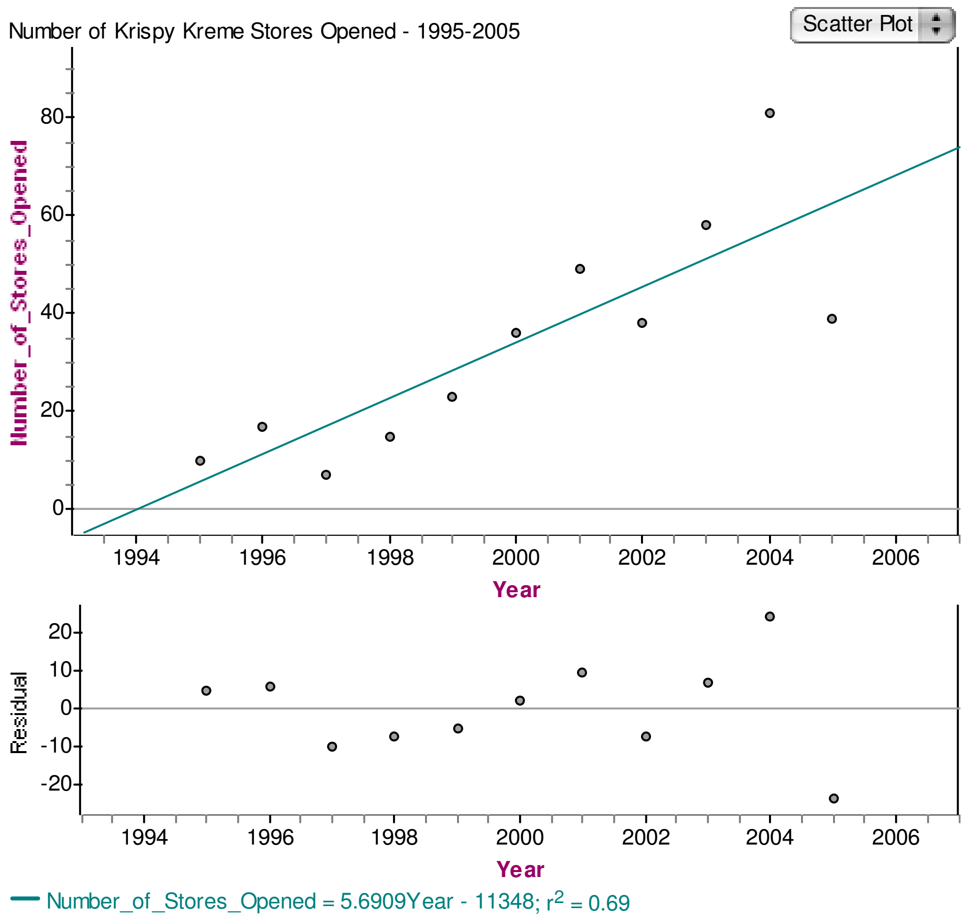
The y-intercept reflects that in the year 0, the number of new stores that should have opened would have been about -1085.

The model predicts that in 1993, approximately 4.7 new stores should have opened. Due to the low r value of 0.78, a reasonable amount of caution should be taken with this estimate.

Actually, only 2 new stores opened in 1993!

Display of 1995 – 2005 data.

BEST IDEA FOR 2009 PREDICTION. ☺



$$\widehat{\text{Number of Stores Opened}} = -11348 + 5.691(\text{Year})$$

$$R^2 = 0.69 \quad r = 0.83$$

The slope of the model, 5.691, reflects that for each one year time passes, an approximate 5.691 new stores will have opened.

The y-intercept reflects that in the year 0, the number of new stores that should have opened would have been about -11348.

The model predicts that in 2009, approximately 85 new stores should have opened. Due to the r value of only 0.83 and the fact that we're extrapolating, a fair amount of caution should be taken with this prediction.