



CHAPTER 1 Project

Modeling the Growth of a Business

In 1971, Starbucks Coffee opened its first location in Pike Place Market—Seattle’s legendary open-air farmer’s market. By 1987, the number of Starbucks stores had grown to 17 and by 2005 there were 10,241 locations. The data in the table below (obtained from Starbucks Coffee’s Web site, www.starbucks.com) summarize the growth of this company from 1987 through 2005.

Year	Number of Locations
1987	17
1989	55
1991	116
1993	272
1995	676
1997	1412
1999	2498
2001	4709
2003	7225
2005	10,241

EXPLORATIONS

- Enter the data in the table into your grapher or computer. (Let $t = 0$ represent 1987.) Draw a scatter plot for the data.
- Refer to page 145 in this chapter. Look at the types of graphs displayed and the associated regression types. Notice that the exponential regression model with $b > 1$ seems to most closely match the plotted data. Use your grapher or computer to find an exponential regression equation to model this data set (see your grapher’s guidebook for instructions on how to do this).
- Use the exponential model you just found to predict the total number of Starbucks locations for 2007 and 2008.
- There were 15,011 Starbucks locations in 2007 and 16,680 locations in 2008. (You can verify these numbers and find more up-to-date information in the investors’ section of the Starbucks Web site.) Why is there such a big difference between your predicted values and the actual number of Starbucks locations? What real-world feature of business growth was not accounted for in the exponential growth model?
- You need to model the data set with an equation that takes into account the fact that growth of a business eventually levels out or reaches a carrying capacity. Refer to page 145 again. Notice that the logistic regression modeling graph appears to show exponential growth at first, but eventually levels out. Use your grapher or computer to find the logistic regression equation to model this data set (see your grapher’s guidebook for instructions on how to do this).
- Use the logistic model you just found to predict the total number of Starbucks locations for 2007 and 2008. How do your predictions compare with the actual number of locations for 2007 and 2008? How many locations do you think there will be in the year 2020?