

## AIDS Cases

*Note: Parts a and b go with Section 2.2 of Calculus with Applications. Part c goes with Section 4.1.*

The following table lists the total (cumulative) number of AIDS cases diagnosed in the United States up to 1995.\*

year	AIDS cases
1982	1,559
1983	4,618
1984	10,806
1985	22,497
1986	41,415
1987	69,837
1988	105,048
1989	147,245
1990	195,020
1991	253,506
1992	330,047
1993	405,863
1994	472,021
1995	527,594

**a.** Using a graphing calculator, plot the points in the table, using 82 for 1982, and so on.

**b.** If your graphing calculator has a quadratic regression feature, find the quadratic polynomial that best fits the data according to the least squares method. Plot this polynomial on the same calculator window as the data. (On a TI-83 calculator, press the STAT key, and then select the CALC menu. QuadReg is item 5. The command QuadReg  $L_1, L_2, Y_1$  finds the quadratic least squares polynomial for the data in lists  $L_1$  and  $L_2$  and stores the polynomial in the function  $Y_1$ .)

**c.** Your graph from part b should show that the quadratic polynomial fits the data very well. Therefore, the number of cumulative number AIDS cases

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\* Centers for Disease Control and Prevention National AIDS Clearinghouse Internet site,  
gopher://cdcnac.org:72/00/4/midyear96/table9.txt.

in the United States by the year  $x$  is approximated by

$$y = 3431.84x^2 - 565,312x + 23,280,100.$$

Using this function, find the instantaneous rate that AIDS cases were increasing in 1993 ( $x = 93$ ). Compare this with the average rate of increase between 1992 and 1993 based on the actual data, and between 1993 and 1994.

**Answers** can be found on the next page.

## Answers to AIDS Cases

**b.**  $y = 3431.84x^2 - 565,312x + 23,280,100$ .

**c.** 73,000 cases per year, 75,800 cases per year, 66,200 cases per year