



ICE - Rates and Concavity

In movies and the popular media, New York is often portrayed as a crime-ridden city. During the late 1990's, crime in New York decreased by more than double the national average¹. Emboldened by these results, New York governor George Pataki (see Figure 1²) made a statement to the press on November 24, 1997. (Note: George Pataki was the first Republican-Conservative governor in the history of New York State.) Portions of this statement are reproduced below³.



Figure 1: New York Governor George E. Pataki.

"Government's top priority must be to safeguard its citizens in our homes, schools and neighborhoods. The FBI's report is yet another example that our policies that keep violent criminals behind bars and off the streets are working. This confirms to the rest of the nation what New Yorkers already know: New York is a safe place to live, work and raise a family ... The Assembly Democrats have repeatedly talked about fighting crime, but has consistently blocked important reforms that will make our streets even safer."

Governor Pataki's comments are based on measurements of the crime rate in New York. That is, the number of crimes committed per year. When Governor Pataki said that his policies "are working," he was referring to a

drop in the crime rate. Governor Pataki's comments are backed up by a lot of statistics and reports⁴. For example, the US Department of Justice keeps a database of violent crimes. Figure 2⁵ shows the national violent crime rate for the US from 1992 to 2000. The units of crime rate are:

Units = number of violent crimes (per 1000 people) per year.

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000
Violent crime rate	49	49.5	51	45	41	39	35	30	26

Table 1: Violent crime rate in US, 1992-2000.

¹ Source: Federal Bureau of Investigation (1997) "Uniform Crime Report. 1996 Crime Statistics."

² Image source: <http://www.state.ny.us/governor/>

³ Source: <http://www.state.ny.us/>

⁴ For example, see: "US violent crime takes sharp drop." available from <http://www.cnn.com> or "Violent crime rate lowest in more than 20 years." also available from <http://www.cnn.com>

⁵ Source: US Department of Justice, Bureau of Justice Statistics. (2000) "National Crime Victimization Survey." and Federal Bureau of Investigation. (1993-2001) "Uniform Crime Reports, 1992-2000."

The information shown in Table 1 is also given in Figure 2 (below).

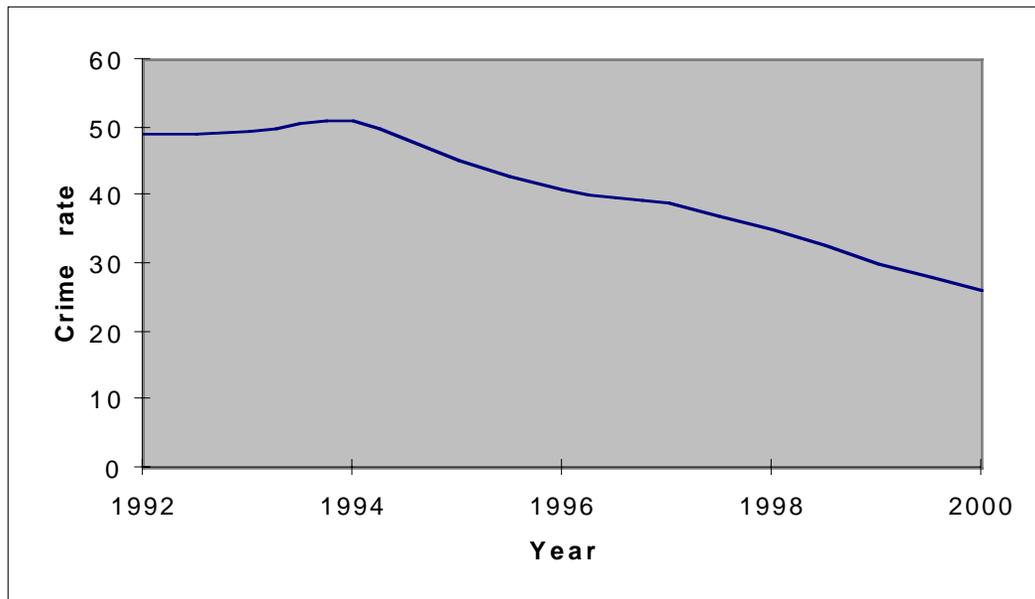


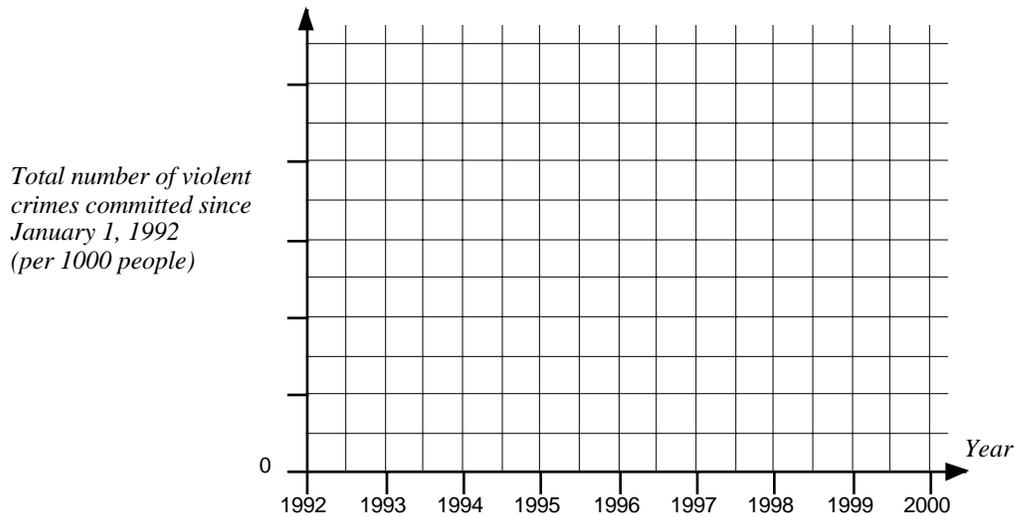
Figure 2: Violent crime rate in US, 1992-2000.

In this activity, you will use the information supplied by the FBI and Department of Justice to create a function that gives the total number of violent crimes (per 1000 people) committed since the beginning of 1992.

• *Using the information provided in Figure 2 and Table 1, find the intervals of time on which the total number of violent crimes committed was an increasing function, and the intervals of time on which the total number of crimes committed was a decreasing function.*

• *Using the information provided in Figure 2 and Table 1, find the intervals of time on which the total number of violent crimes committed was a concave up function, and the intervals of time on which the total number of crimes committed was a concave down function.*

- Use the information on concavity and increasing/decreasing that you have found to sketch a graph showing the total number of violent crimes committed versus time.

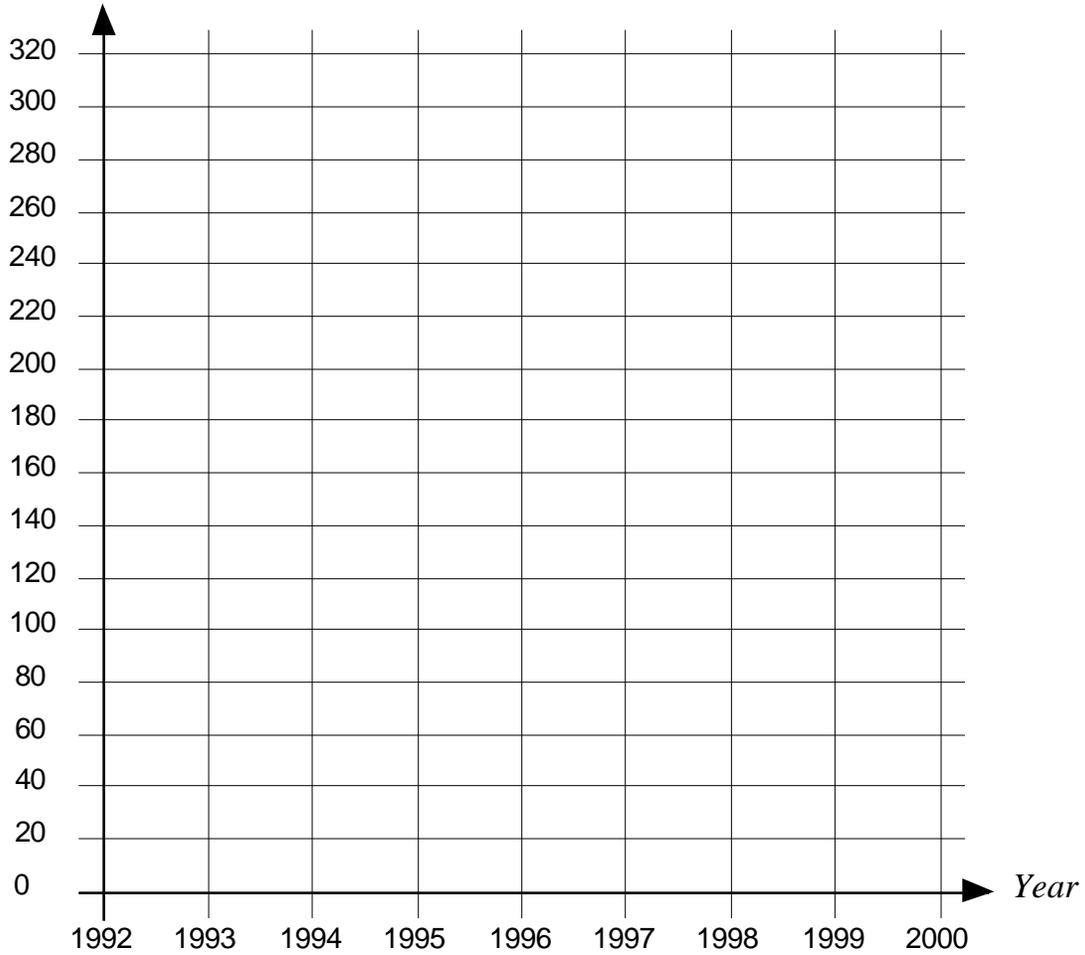


- Based on the appearance of your graph, do you think that Governor Pataki's speech of November 24 1997 was an accurate description of the facts, or an example of overblown political posturing?

- Use the information on the crime rate from Table 1 to complete the table shown below. Plot the information that you calculate on the axes provided.

Year	Number of violent crimes (per 1000 people)	Total number of violent crimes since 1/1/92 (per 1000 people)
1992		
1993		
1994		
1995		
1996		
1997		
1998		
1999		
2000		

Total number of violent crimes since 1/1/92 (per 1000 people)



End note⁶: During 2000, FBI statistics revealed that the trend in dramatic drops in the violent crime rate had come to an end. Throughout the 1990's, most parts of the US saw dramatic drops in the rate of violent crime, but in 2000 the violent crime rate in both the South and the Northeast had started to climb again. Analysts cite a growing teenage population and the unusually large numbers of felons released from prison as major contributing factors.

⁶ Source: Detroit News, December 19 2000. "Drop in violent crime ends."