

101. **Make a Decision** The table shows the total Department of Defense manpower M (in thousands) from 1970 to 2003.
(Data Source: U.S. Department of Defense)

Year	Manpower, M	Year	Manpower, M
1970	3065	1987	2174
1971	2713	1988	2138
1972	2322	1989	2130
1973	2252	1990	2044
1974	2162	1991	1986
1975	2128	1992	1807
1976	2082	1993	1705
1977	2075	1994	1610
1978	2062	1995	1518
1979	2027	1996	1472
1980	2051	1997	1439
1981	2083	1998	1407
1982	2109	1999	1386
1983	2123	2000	1384
1984	2138	2001	1385
1985	2151	2002	1414
1986	2169	2003	1434

- (a) Use a graphing utility to plot the data. Let t represent the year, with $t = 0$ corresponding to 1970.
- (b) A model that approximates the data is given by
- $$M = \frac{1.5379t^3 - 62.9226t^2 + 547.5099t + 3036.5276}{0.0010t^3 - 0.0407t^2 + 0.3902t + 1}$$
- where M is the manpower (in thousands) and t is the year, with $t = 0$ corresponding to 1970. Create a table showing the actual values of M and the values of M given the model.
- (c) Does it appear that the model is a good fit for the data? Explain your reasoning.
- (d) Examine the scatter plot in part (a). Is there another type of model that can be used to model the data? Explain your reasoning.
- (e) Use the *regression* feature of a graphing utility to find the type of model described in part (d) for the data. Let t represent the year, with $t = 0$ corresponding to 1970.
- (f) Use a graphing utility to graph the original data and both the given rational model and the model that you found in part (e) in the same viewing window.
- (g) Use both models to predict the total manpower in 2008. Which model should be used to predict future values? Explain your reasoning.