Project: Department of Defense The table shows the total numbers of Department of Defense personnel P (in thousands) from 1980 through 2010. *(Source: U.S. Department of Defense)*

Year	Personnel, P
1980	2051
1981	2083
1982	2109
1983	2123
1984	2138
1985	2151
1986	2169
1987	2174
1988	2138
1989	2130
1990	2044
1991	1986
1992	1807
1993	1705
1994	1610
1995	1518

Year	Personnel, P
1996	1472
1997	1439
1998	1407
1999	1386
2000	1384
2001	1385
2002	1414
2003	1434
2004	1427
2005	1389
2006	1385
2007	1380
2008	1402
2009	1419
2010	1431

(a) Use a graphing utility to plot the data. Let t represent the year, with $t = 0$ corresponding to 1980.

(b) A model that approximates the data is given by

$$P = \frac{9.6518t^2 - 244.743t + 2044.77}{0.0059t^2 - 0.131t + 1}$$

where P is the total number of personnel (in thousands) and t is the year, with $t = 0$ corresponding to 1980. Create a table showing the actual values of P and the values of P obtained using 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 1980.

(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 personnel in 2018. Which model should be used to predict future values? Explain your reasoning.