

22. **★ OPEN ENDED** Write two different cubic functions whose graphs pass through the points $(-3, 0)$, $(-1, 0)$, and $(2, 6)$.
23. **★ SHORT RESPONSE** How many points do you need to determine a quartic function? a quintic (fifth-degree) function? *Justify* your answers.
24. **CHALLENGE** Substitute the expressions $k, k + 1, k + 2, \dots, k + 5$ for x in the function $f(x) = ax^3 + bx^2 + cx + d$ to generate six equally-spaced ordered pairs. Then show that third-order differences are constant.

PROBLEM SOLVING

EXAMPLE 3

on p. 395
for Ex. 25

25. **GEOMETRY** Find a polynomial function that gives the number of diagonals d of a polygon with n sides.

Number of sides, n	3	4	5	6	7	8
Number of diagonals, d	0	2	5	9	14	20

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EXAMPLE 4

on p. 396
for Exs. 26–28

26. **AVIATION** The table shows the number of active pilots (in thousands) with airline transport licenses in the United States for the years 1997 to 2004. Use a graphing calculator to find a polynomial model for the data.

Years since 1997, t	0	1	2	3	4	5	6	7
Transport pilots, p	131	135	138	142	145	145	144	145

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27. **MULTI-STEP PROBLEM** The table shows the average U.S. movie ticket price (in dollars) for various years from 1983 to 2003.

Years since 1983, t	0	4	8	12	16	20
Movie ticket price, m	3.15	3.91	4.21	4.35	5.08	6.03

- a. Use a graphing calculator to find a polynomial model for the data.
- b. Estimate the average U.S. movie ticket price in 2010.
- c. In which year was the average U.S. movie ticket price about \$4.50?
28. **★ SHORT RESPONSE** Based on data collected from friends, you estimate the cumulative profits (in dollars) after each of six months for two potential businesses. Find a polynomial function that models the profit for each business. Which business will yield the greatest long-term profit? Why?

Yard work	Month, t	1	2	3	4	5	6
	Profit, p	30	210	410	680	1070	1630
Pet care	Month, t	1	2	3	4	5	6
	Profit, p	30	50	220	540	1010	1630

