

5.9 EXERCISES

HOMEWORK KEY

 = **WORKED-OUT SOLUTIONS**
on p. WS1 for Exs. 9, 15, and 27

 = **TAKS PRACTICE AND REASONING**
Exs. 10, 22, 23, 28, 31, and 32

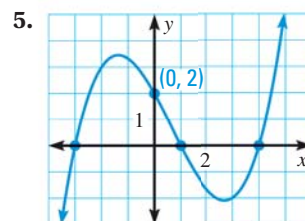
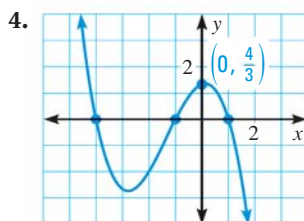
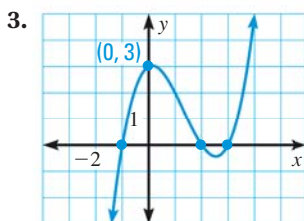
SKILL PRACTICE

- VOCABULARY** Copy and complete: When the x -values in a data set are equally spaced, the differences of consecutive y -values are called ? .
- WRITING** Describe first-order differences and second-order differences.

EXAMPLE 1

on p. 393
for Exs. 3–11

WRITING CUBIC FUNCTIONS Write the cubic function whose graph is shown.



CUBIC MODELS Write a cubic function whose graph passes through the points.

- $(-3, 0), (-1, 10), (0, 0), (4, 0)$
- $(-2, 0), (-1, 0), (0, -8), (2, 0)$
- $(-3, 0), (1, 0), (3, 2), (4, 0)$
- 9.** $(-5, 0), (0, 0), (1, -12), (6, 0)$


10. **TAKS PRACTICE AND REASONING** Which cubic function's graph passes through the points $(-3, 0), (-1, 0), (3, 0)$, and $(0, 3)$?

- A $f(x) = (x - 3)(x + 3)(x - 1)$ B $f(x) = -\frac{1}{3}(x - 3)(x + 3)(x + 1)$
 C $f(x) = -2(x - 3)(x + 3)(x - 1)$ D $f(x) = (x - 3)(x + 3)(x + 1)$

11. **ERROR ANALYSIS** A student tried to write a cubic function whose graph has x -intercepts $-1, 2$, and 5 , and passes through $(1, 3)$. Describe and correct the error in the student's calculation of the leading coefficient a .

$$1 = a(3 + 1)(3 - 2)(3 - 5)$$

$$1 = -8a$$

$$-\frac{1}{8} = a$$


EXAMPLE 2

on p. 394
for Exs. 12–17

FINDING FINITE DIFFERENCES Show that the n th-order differences for the given function of degree n are nonzero and constant.

- $f(x) = 5x^3 - 10$
- $f(x) = -2x^2 + 5x$
- $f(x) = x^4 - 3x^2 + 2$
- 15.** $f(x) = 4x^2 - 9x + 2$
- $f(x) = x^3 - 4x^2 - x + 1$
- $f(x) = 2x^5 - 3x^2 + x$

EXAMPLE 3

on p. 395
for Exs. 18–21

FINDING A MODEL Use finite differences and a system of equations to find a polynomial function that fits the data in the table.

18.

x	1	2	3	4	5	6
$f(x)$	0	-3	-8	-15	-24	-35

19.

x	1	2	3	4	5	6
$f(x)$	11	14	9	-4	-25	-54

20.

x	1	2	3	4	5	6
$f(x)$	-12	-14	-10	6	40	98

21.

x	1	2	3	4	5	6
$f(x)$	5	14	27	41	53	60