

## 5-6 Practice

### The Remainder and Factor Theorems

Use synthetic substitution to find  $f(-3)$  and  $f(4)$  for each function.

1.  $f(x) = x^2 + 2x + 3$

2.  $f(x) = x^2 - 5x + 10$

3.  $f(x) = x^2 - 5x - 4$

4.  $f(x) = x^3 - x^2 - 2x + 3$

5.  $f(x) = x^3 + 2x^2 + 5$

6.  $f(x) = x^3 - 6x^2 + 2x$

7.  $f(x) = x^3 - 2x^2 - 2x + 8$

8.  $f(x) = x^3 - x^2 + 4x - 4$

9.  $f(x) = x^3 + 3x^2 + 2x - 50$

10.  $f(x) = x^4 + x^3 - 3x^2 - x + 12$

11.  $f(x) = x^4 - 2x^2 - x + 7$

12.  $f(x) = 2x^4 - 3x^3 + 4x^2 - 2x + 1$

13.  $f(x) = 2x^4 - x^3 + 2x^2 - 26$

14.  $f(x) = 3x^4 - 4x^3 + 3x^2 - 5x - 3$

15.  $f(x) = x^5 + 7x^3 - 4x - 10$

16.  $f(x) = x^6 + 2x^5 - x^4 + x^3 - 9x^2 + 20$

Given a polynomial and one of its factors, find the remaining factors of the polynomial.

17.  $x^3 + 3x^2 - 6x - 8; x - 2$

18.  $x^3 + 7x^2 + 7x - 15; x - 1$

19.  $x^3 - 9x^2 + 27x - 27; x - 3$

20.  $x^3 - x^2 - 8x + 12; x + 3$

21.  $x^3 + 5x^2 - 2x - 24; x - 2$

22.  $x^3 - x^2 - 14x + 24; x + 4$

23.  $3x^3 - 4x^2 - 17x + 6; x + 2$

24.  $4x^3 - 12x^2 - x + 3; x - 3$

25.  $18x^3 + 9x^2 - 2x - 1; 2x + 1$

26.  $6x^3 + 5x^2 - 3x - 2; 3x - 2$

27.  $x^5 + x^4 - 5x^3 - 5x^2 + 4x + 4; x + 1$

28.  $x^5 - 2x^4 + 4x^3 - 8x^2 - 5x + 10; x - 2$

**29. POPULATION** The projected population in thousands for a city over the next several years can be estimated by the function  $P(x) = x^3 + 2x^2 - 8x + 520$ , where  $x$  is the number of years since 2005. Use synthetic substitution to estimate the population for 2015.

**30. VOLUME** The volume of water in a rectangular swimming pool can be modeled by the polynomial  $2x^3 - 9x^2 + 7x + 6$ . If the depth of the pool is given by the polynomial  $2x + 1$ , what polynomials express the length and width of the pool?