Use synthetic substitution to find $f(-5)$ and $f(2)$ for each function.

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

ANSWER:
−59; 11

9. $f(x) = x^2 - 8x + 6$

ANSWER:
71; −6

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

ANSWER:
1707; 62

11. $f(x) = 2x^3 - 8x^2 - 2x + 5$

ANSWER:
−435; −15

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

ANSWER:
−98; 0

13. $f(x) = x^5 + 8x^3 + 2x - 15$

ANSWER:
−4150; 85

14. $f(x) = x^6 - 4x^4 + 3x^2 - 10$

ANSWER:
13,190; 2

15. $f(x) = x^4 - 6x - 8$

ANSWER:
647; −4

16. **FINANCIAL LITERACY** A specific car's fuel economy in miles per gallon can be approximated by $f(x) = 0.00000056x^4 - 0.000018x^3 - 0.016x^2 + 1.38x - 0.38$, where x represents the car's speed in miles per hour. Determine the fuel economy when the car is travelling 40, 50 and 60 miles per hour.

ANSWER:
29.5 mpg; 29.87 mpg; 28.19 mpg

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

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

ANSWER:

$(x-1)^2$

18. $x^4 + 2x^3 - 8x - 16$; $x + 2$

ANSWER:

$x - 2, x^2 + 2x + 4$

19. $x^3 - x^2 - 10x - 8$; $x + 2$

ANSWER:

$x - 4, x + 1$

20. $x^3 - x^2 - 5x - 3$; $x - 3$

ANSWER:

$(x+1)^2$

21. $2x^3 + 17x^2 + 23x - 42$; $x - 1$

ANSWER:

$x + 6, 2x + 7$

22. $2x^3 + 7x^2 - 53x - 28$; $x - 4$

ANSWER:

$x + 7, 2x + 1$

23. $x^4 + 2x^3 + 2x^2 - 2x - 3$; $x - 1$

ANSWER:

$x + 1, x^2 + 2x + 3$

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

ANSWER:

$x - 1, x + 1$

25. $6x^3 - 25x^2 + 2x + 8$; $2x + 1$

ANSWER:

$x - 4, 3x - 2$

26. $16x^5 - 32x^4 - 81x + 162$; $2x - 3$

ANSWER:

$x - 2, 2x + 3, 4x^2 + 9$

27. **BOATING** A motor boat travelling against waves accelerates from a resting position. Suppose the speed of the boat in feet per second is given by the function $f(t) = -0.04t^4 + 0.8t^3 + 0.5t^2 - t$, where t is the time in seconds.
 a. Find the speed of the boat at 1, 2, and 3 seconds.
 b. It takes 6 seconds for the boat to travel between two buoys while it is accelerating. Use synthetic substitution to find $f(6)$ and explain what this means.
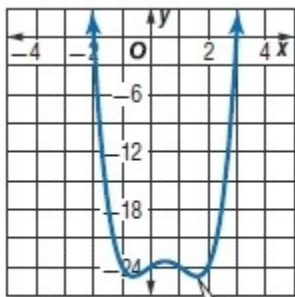
 ANSWER:

 a. 0.26 ft/s, 5.76 ft/s, 19.86 ft/s
 b. 132.96 ft/s; This means the boat is travelling at 132.96 ft/s when it passes the second buoy.

28. **CCSS REASONING** A company's sales, in millions of dollars, of consumer electronics can be modeled by $S(x) = -1.7x^3 + 18x^2 + 26.4x + 678$, where x is the number of years since 2005.
 a. Use synthetic substitution to estimate the sales for 2017 and 2020.
 b. Do you think this model is useful in estimating future sales? Explain.

 ANSWER:

 a. $1513.2 million; $1074 million
 b. Sample answer: No; the graph of the function has a relative maximum at about $x = 8$ or the year 2008 and then the values for sales decrease. It is not likely that the sales would continually decrease.

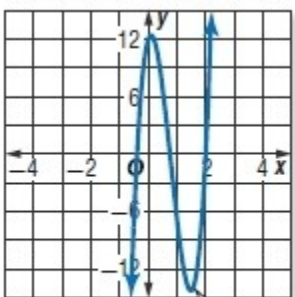**Use the graphs to find all of the factors for each polynomial function.**

$f(x) = x^4 - 2x^3 - x^2 + 2x - 24$

29.

 ANSWER:

 $x + 2, x - 3, x^2 - x + 4$

$f(x) = 20x^3 - 47x^2 + 8x + 12$

30.

 ANSWER:

 $x - 2, 4x - 3, 5x + 2$