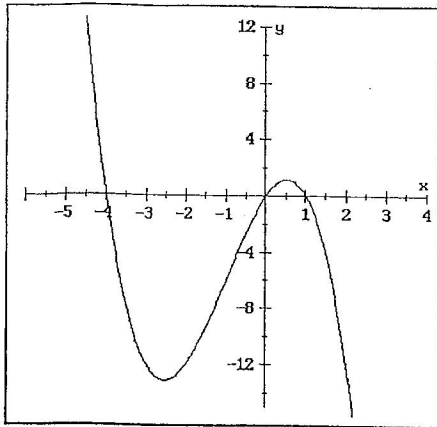
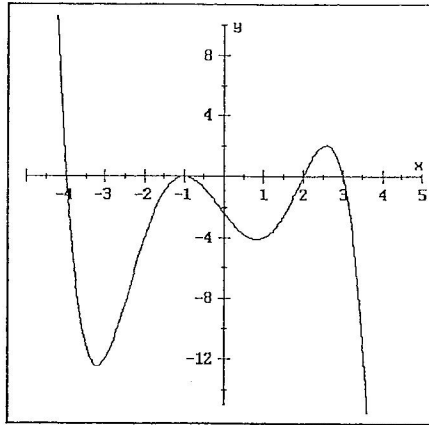


Factoring a Polynomial by Using Its Graph I

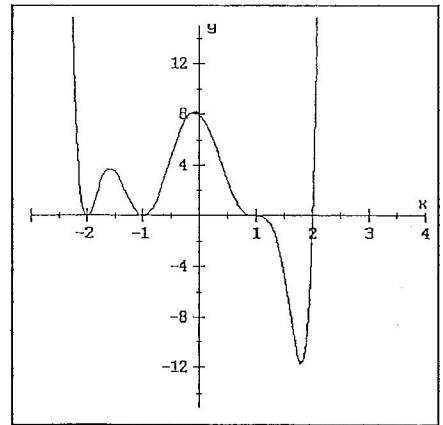
Give a possible factorization of the following polynomials. Do NOT multiply out the factors!
Be sure to use your knowledge of the Leading Coefficient Test and Repeated Zeros.



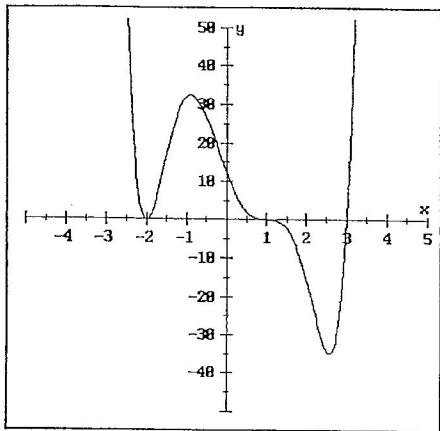
roots $x = -4, 0, 1$
1) $y = (x+4)(x)(x-1)$



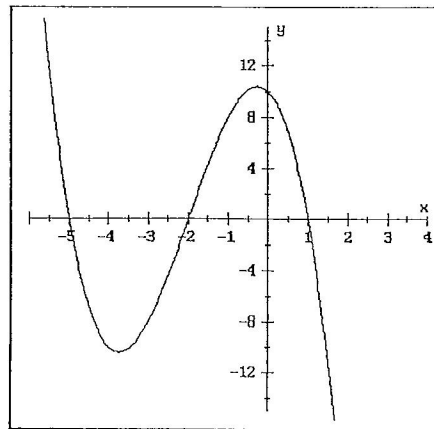
roots $x = -4, -1, 2, 3$
2) $y = (x+4)(x+1)(x-2)(x-3)$



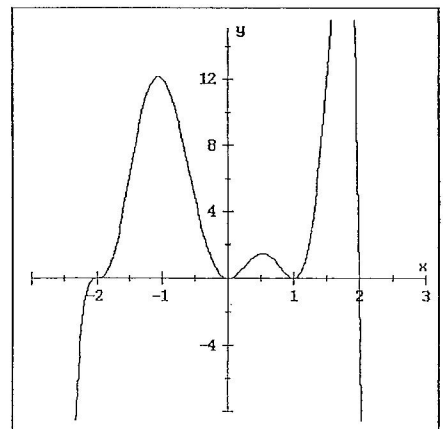
roots $x = -2, -1, 1, 2$
 $y = (x+2)(x+1)(x-1)(x-2)$



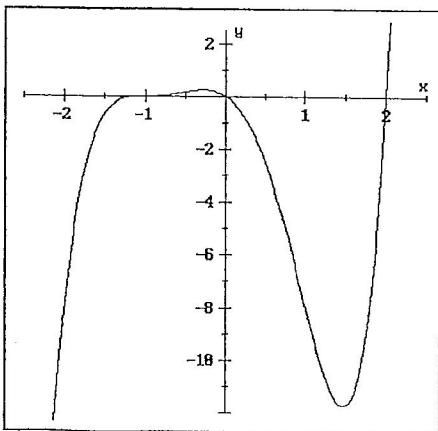
4)



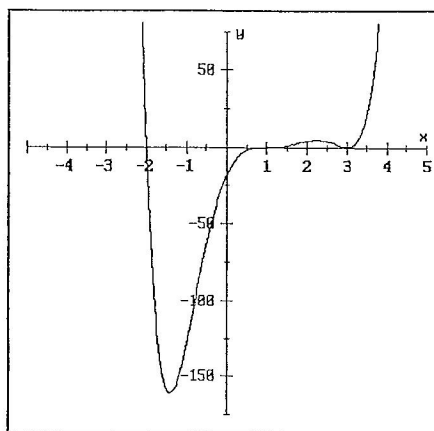
5)



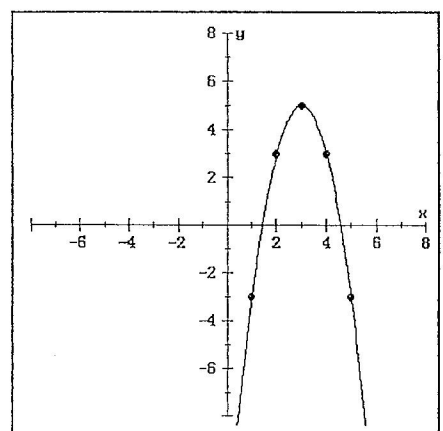
6)



7)



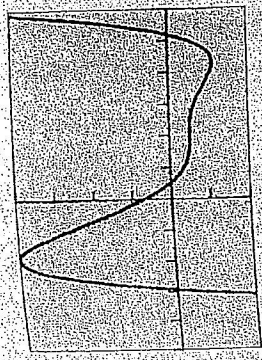
roots $x = -2, 1, 3$
8) $y = (x+2)(x-1)(x-3)^2$



approx. roots $x = 1.2, 4.8$
9) $y = (x-1.2)(x-4.8)$

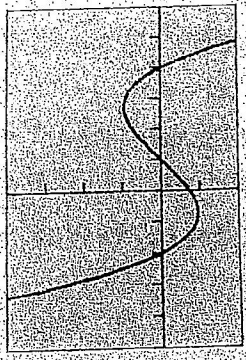
Section 2.3 Practice (p.201-205)

In Exercises 9-12, match the polynomial function with its graph. Explain your choice. Do not use a graphing calculator.



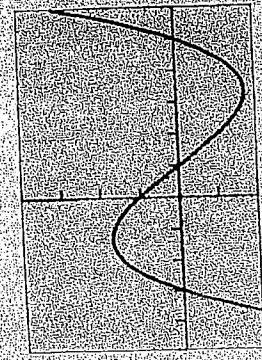
[-5, 6] by [-200, 4000]

(a)



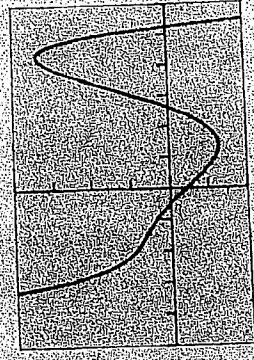
[-5, 6] by [-200, 4000]

(b)



[-5, 6] by [-200, 4000]

(c)



[-5, 6] by [-200, 4000]

(d)

C 9. $f(x) = 7x^3 - 21x^2 - 91x + 104$

B 10. $f(x) = -9x^3 + 27x^2 + 54x - 73$

A 11. $f(x) = x^3 - 8x^4 + 9x^3 + 58x^2 - 164x + 69$

D 12. $f(x) = -x^5 + 3x^4 + 16x^3 - 2x^2 - 95x - 44$

cubic #9 pos leading coeff.
 #10 neg leading coeff.
 #11 pos. l.c.
 #12 neg. l.c.

37. $3x^3 - x^2 - 2x = 0$

$x(3x^2 - x - 2) = 0$

$x(3x + 2)(x - 1) = 0$

In Exercises 17-24, graph the function in a viewing window that shows all of its extrema and x-intercepts. Describe the end behavior using limits.

17. $f(x) = (x - 1)(x + 2)(x + 3)$ x-intercepts at $x = 1, -2, -3$

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

19. $f(x) = -x^3 + 4x^2 + 31x - 70$

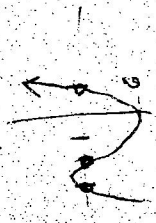
20. $f(x) = x^3 - 2x^2 - 41x + 42$

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

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

23. $f(x) = 2x^4 - 5x^3 - 17x^2 + 14x + 41$

24. $f(x) = -3x^4 - 5x^3 + 15x^2 - 5x + 19$



$[-10, 10] \times [-10, 10]$

$\lim_{x \rightarrow \infty} f(x) = \infty$

$\lim_{x \rightarrow -\infty} f(x) = -\infty$

19. x-intercepts at $x = -5, 2, 7$

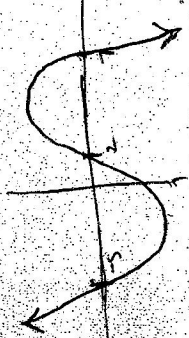
In Exercises 25-28, describe the end behavior of the polynomial function using $\lim_{x \rightarrow \infty} f(x)$ and $\lim_{x \rightarrow -\infty} f(x)$.

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

26. $f(x) = -x^3 + 7x^2 - 4x + 3$

27. $f(x) = 7x^2 - x^3 + 3x - 4$

28. $f(x) = x^3 - x^4 + 3x^2 - 2x + 7$



$[-10, 10] \times [-120, 100]$

$\lim_{x \rightarrow \infty} f(x) = -\infty$

$\lim_{x \rightarrow -\infty} f(x) = \infty$

In Exercises 33-38, find the zeros of the function algebraically.

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

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

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

36. $f(x) = x^3 - 25x$

37. $f(x) = 3x^3 - x^2 - 2x$

38. $f(x) = 5x^3 - 5x^2 - 10x$

33. $x^2 + 2x - 8 = 0$

$(x+4)(x-2) = 0$

$x = -4, x = 2$

34. $9x^2 - 3x - 2 = 0$

$(3x-2)(3x+1) = 0$

$3x-2=0 \quad 3x+1=0$

$x = 2/3 \quad x = -1/3$