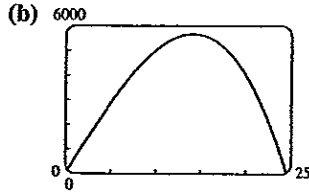


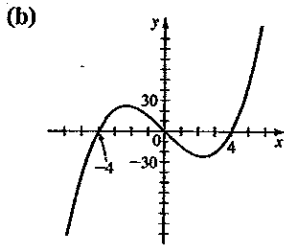
12. (a)  $V(x) = 600x - x^3$   
 (c) 14.14 in. by 28.28 in.



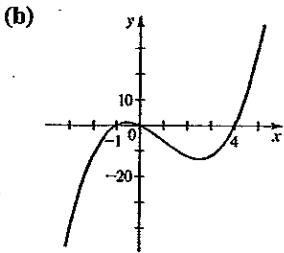
In answers 13–20, the first polynomial given is the quotient and the second is the remainder.

13.  $x - 1, 3$  14.  $x + 4, 0$  15.  $x^2 + 3x + 23, 94$   
 16.  $x^2 - x + 3, -19$  17.  $x^3 - 5x^2 + 17x - 83, 422$   
 18.  $2x^3 - 5x^2 + 20x - 80, 308$  19.  $2x - 3, 12$   
 20.  $x^2 + x - 4, 12$  21. 3 22. 21 25. 8 26. 0  
 27. (a)  $\pm 1, \pm 2; \pm 3, \pm 6, \pm 9, \pm 18$   
 (b) 2 or 0 positive, 3 or 1 negative  
 28. (a)  $\pm 1, \pm 2, \pm 4, \pm \frac{1}{2}, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{4}{3}, \pm \frac{1}{6}$   
 (b) 0 positive, 0, 2, or 4 negative

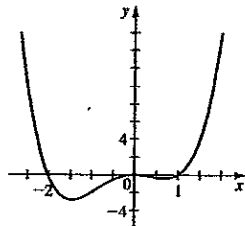
29. (a)  $-4, 0, 4$



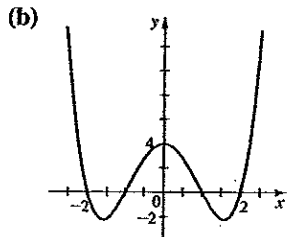
30. (a)  $-1, 0, 4$



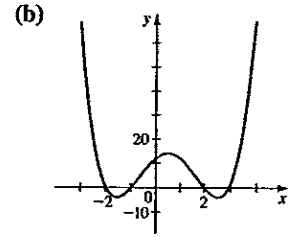
31. (a)  $-2, 0$  (multiplicity 2), 1 (b)



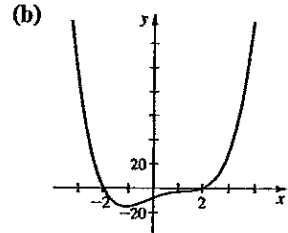
32. (a)  $-2, -1, 1, 2$



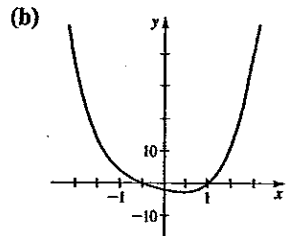
33. (a)  $-2, -1, 2, 3$



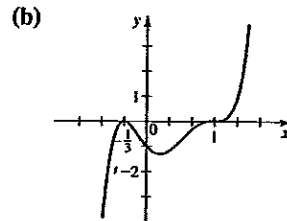
34. (a)  $-2, 2$



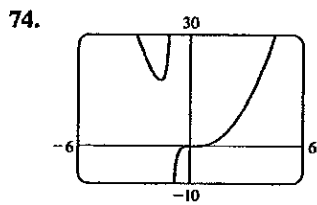
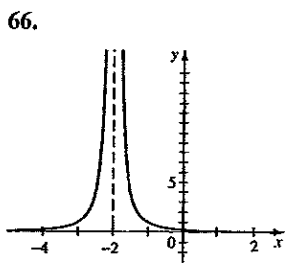
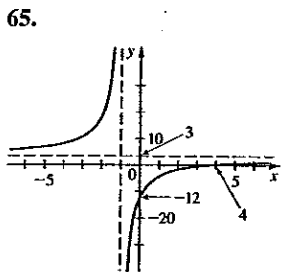
35. (a)  $-\frac{1}{2}, 1$



36. (a)  $-\frac{1}{3}$  (multiplicity 2), 1 (multiplicity 3)

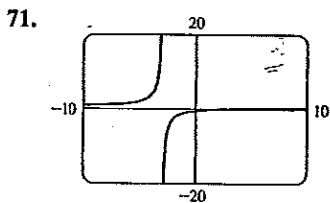
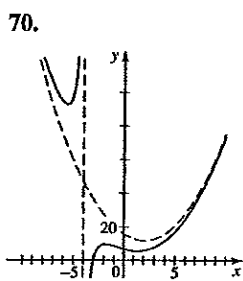
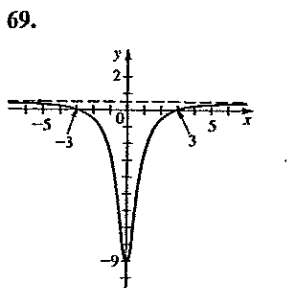
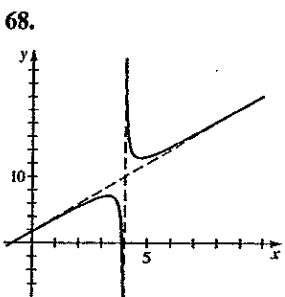
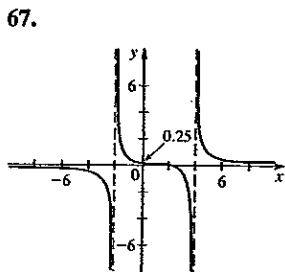


37.  $3 + i$  38.  $-3 - 2i$  39.  $8 - i$  40.  $2 + 8i$   
 41.  $\frac{6}{5} + \frac{8}{5}i$  42.  $\frac{41}{25} - \frac{12}{25}i$  43.  $i$  44.  $-2 + 2i$  45. 2  
 46.  $-20$  47.  $4x^3 - 18x^2 + 14x + 12$   
 48.  $x^4 - 8x^3 + 25x^2 - 72x + 144$  49. No; since the complex conjugates of imaginary zeros will also be zeros, the polynomial would have 8 zeros, contradicting the requirement that it have degree 4. 51.  $-3, 1, 5$  52.  $-3, -1, \frac{3}{2}$   
 53.  $-1 \pm 2i, -2$  (multiplicity 2) 54.  $-4, -1, -1 \pm \sqrt{6}$   
 55.  $\pm 2, 1$  (multiplicity 3)  
 56.  $-3, 3, \pm 3i$  57.  $\pm 2, \pm 1 \pm i\sqrt{3}$   
 58.  $\frac{1}{2}, -\frac{1}{3}$  (multiplicity 2) 59. 1, 3,  $\frac{-1 \pm i\sqrt{7}}{2}$   
 60.  $\pm 3i, \pm i\sqrt{6}$  61.  $x = -0.5, 3$   
 62.  $x = -3, -2, 4$  63.  $x \approx -0.24, 4.24$  64.  $x \approx 1.34$

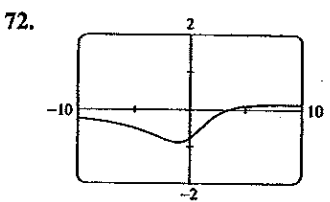


x-intercepts  $0, \frac{1}{2}$   
 y-intercept 0; vertical  $x = -1$   
 local maximum  $(0, 0)$   
 local minimums  
 $(-1.57, 17.90),$   
 $(0.32, -0.03)$   
 end behavior  
 $y = 2x^2 - 3x + 3$

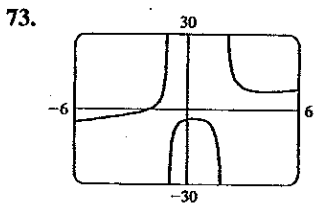
75.  $(-2, -28), (1, 26), (2, 68), (5, 770)$



x-intercept 3  
 y-intercept  $-0.5$   
 vertical  $x = -3$   
 horizontal  $y = 0.5$   
 no local extrema

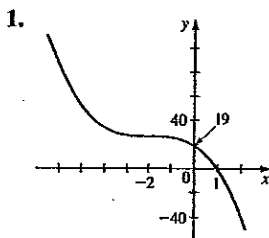


x-intercept 3.5  
 y-intercept  $-0.78$   
 horizontal  $y = 0$   
 local minimum  
 $(-1.11, -0.90)$   
 local maximum  $(8.11, 0.12)$

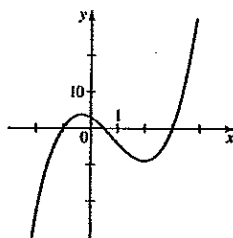


x-intercept  $-2$   
 y-intercept  $-4$   
 vertical  $x = -1, x = 2$   
 slant  $y = x + 1$   
 local maximum  
 $(0.425, -3.599)$   
 local minimum  
 $(4.216, 7.175)$

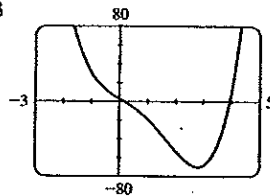
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2. (a)  $x^3 + 2x^2 + 2, 9$  (b)  $x^3 + 2x^2 + \frac{1}{2}, \frac{15}{2}$   
 3. (a)  $\pm 1, \pm 3, \pm \frac{1}{2}, \pm \frac{3}{2}$  (b)  $2(x - 3)(x - \frac{1}{2})(x + 1)$   
 (c)  $-1, \frac{1}{2}, 3$   
 (d)



4. (a)  $7 + i$  (b)  $-1 - 5i$  (c)  $18 + i$  (d)  $\frac{6}{25} - \frac{17}{25}i$   
 (e) 1 (f)  $6 - 2i$  5.  $3, -1 \pm i$   
 6.  $(x - 1)^2(x - 2i)(x + 2i)$  7.  $x^4 + 2x^3 + 10x^2 + 18x + 9$   
 8. (a) 4, 2, or 0 positive; 0 negative  
 (c) 0.17, 3.93



(d) Local minimum  $(2.8, -70.3)$

9. (a)  $r, u$  (b)  $s$  (c)  $s$  (d)

