

A

Selected Answers

- 1.1.1. $(2/3)x + (1/3)$
 1.1.2. $y = -2x$
 1.1.3. $(-2/3)x + (1/3)$
 1.1.4. $y = 2x + 2, 2, -1$
 1.1.5. $y = -x + 6, 6, 6$
 1.1.6. $y = x/2 + 1/2, 1/2, -1$
 1.1.7. $y = 3/2$, y -intercept: $3/2$, no x -intercept
 1.1.8. $y = (-2/3)x - 2, -2, -3$
 1.1.9. yes
 1.1.10. $y = 0, y = -2x + 2, y = 2x + 2$
 1.1.11. $y = 75t$ (t in hours); 164 minutes
 1.1.12. $y = (9/5)x + 32, (-40, -40)$
 1.1.13. $y = 0.15x + 10$
 1.1.14. $0.03x + 1.2$
 1.1.15. (a) $y = \begin{cases} 0 & 0 \leq x < 100 \\ (x/10) - 10 & 100 \leq x \leq 1000 \\ x - 910 & 1000 < x \end{cases}$

- 1.1.16. $y = \begin{cases} 0.15x & 0 \leq x \leq 19450 \\ 0.28x - 2528.50 & 19450 < x \leq 47050 \\ 0.33x - 4881 & 47050 < x \leq 97620 \end{cases}$
 1.1.17. (a) $P = -0.0001x + 2$
 (b) $x = -10000P + 20000$
 1.1.18. $(2/25)x - (16/5)$
 1.2.1. (a) $x^2 + y^2 = 9$
 (b) $(x - 5)^2 + (y - 6)^2 = 9$
 (c) $(x + 5)^2 + (y + 6)^2 = 9$
 1.2.2. (a) $\Delta x = 2, \Delta y = 3, m = 3/2,$
 $y = (3/2)x - 3, \sqrt{13}$
 (b) $\Delta x = -1, \Delta y = 3, m = -3,$
 $y = -3x + 2, \sqrt{10}$
 (c) $\Delta x = -2, \Delta y = -2, m = 1,$
 $y = x, \sqrt{8}$
 1.2.6. $(x + 2/7)^2 + (y - 41/7)^2 = 1300/49$
 1.3.1. $\{x \mid x \geq 3/2\}$
 1.3.2. $\{x \mid x \neq -1\}$
 1.3.3. $\{x \mid x \neq 1 \text{ and } x \neq -1\}$
 1.3.4. $\{x \mid x < 0\}$
 1.3.5. $\{x \mid x \in \mathbb{R}\}$, i.e., all x

- 1.3.6. $\{x \mid x \geq 0\}$
 1.3.7. $\{x \mid h - r \leq x \leq h + r\}$
 1.3.8. $\{x \mid x \geq 1 \text{ or } x < 0\}$
 1.3.9. $\{x \mid -1/3 < x < 1/3\}$
 1.3.10. $\{x \mid x \geq 0 \text{ and } x \neq 1\}$
 1.3.11. $\{x \mid x \geq 0 \text{ and } x \neq 1\}$
 1.3.12. \mathbb{R}
 1.3.13. $\{x \mid x \geq 3\}, \{x \mid x \geq 0\}$
 1.3.14. $A = x(500 - 2x), \{x \mid 0 \leq x \leq 250\}$
 1.3.15. $V = r(50 - \pi r^2), \{r \mid 0 < r \leq \sqrt{50/\pi}\}$
 1.3.16. $A = 2\pi r^2 + 2000/r, \{r \mid 0 < r < \infty\}$
 2.1.1. $-5, -2.47106145, -2.4067927, -2.400676, -2.4$
 2.1.2. $-4/3, -24/7, 7/24, 3/4$
 2.1.3. $-0.107526881, -0.11074197, -0.1110741, \frac{-1}{3(3 + \Delta x)} \rightarrow \frac{-1}{9}$
 2.1.4. $\frac{3 + 3\Delta x + \Delta x^2}{1 + \Delta x} \rightarrow 3$
 2.1.5. $3.31, 3.003001, 3.0000, 3 + 3\Delta x + \Delta x^2 \rightarrow 3$
 2.1.6. m
 2.2.1. $10, 25/2, 20, 15, 25, 35.$
 2.2.2. $5, 4.1, 4.01, 4.001, 4 + \Delta t \rightarrow 4$
 2.2.3. $-10.29, -9.849, -9.8049, -9.8 - 4.9\Delta t \rightarrow -9.8$
 2.3.1. 7
 2.3.2. 5
 2.3.3. 0
 2.3.4. undefined
 2.3.5. $1/6$
 2.3.6. 0
 2.3.7. 3
 2.3.8. 172
 2.3.9. 0
 2.3.10. 2
 2.3.11. does not exist
 2.3.12. $\sqrt{2}$
 2.3.13. $3a^2$
 2.3.14. 512
 2.3.15. -4
 2.3.16. 0
 2.3.18. (a) 8, (b) 6, (c) dne, (d) -2 , (e) -1 , (f) 8, (g) 7, (h) 6, (i) 3, (j) $-3/2$, (k) 6, (l) 2
 2.4.1. $-x/\sqrt{169 - x^2}$
 2.4.2. $-9.8t$
 2.4.3. $2x + 1/x^2$
 2.4.4. $2ax + b$
 2.4.5. $3x^2$
 2.4.8. $-2/(2x + 1)^{3/2}$
 2.4.9. $5/(t + 2)^2$
 2.4.10. $y = -13x + 17$
 2.4.11. -8
 2.5.6. -0.5 or 1.3 or 3.2
 3.1.1. $100x^{99}$
 3.1.2. $-100x^{-101}$
 3.1.3. $-5x^{-6}$
 3.1.4. $\pi x^{\pi-1}$
 3.1.5. $(3/4)x^{-1/4}$
 3.1.6. $-(9/7)x^{-16/7}$
 3.2.1. $15x^2 + 24x$
 3.2.2. $-20x^4 + 6x + 10/x^3$
 3.2.3. $-30x + 25$

- 3.2.4. $6x^2 + 2x - 8$
 3.2.5. $3x^2 + 6x - 1$
 3.2.6. $9x^2 - x/\sqrt{625 - x^2}$
 3.2.7. $y = 13x/4 + 5$
 3.2.8. $y = 24x - 48 - \pi^3$
 3.2.9. $-49t/5 + 5, -49/5$
 3.2.11. $\sum_{k=1}^n ka_k x^{k-1}$
 3.2.12. $x^3/16 - 3x/4 + 4$
 3.3.1. $3x^2(x^3 - 5x + 10) + x^3(3x^2 - 5)$
 3.3.2. $(x^2 + 5x - 3)(5x^4 - 18x^2 + 6x - 7) + (2x + 5)(x^5 - 6x^3 + 3x^2 - 7x + 1)$
 3.3.3. $\frac{\sqrt{625 - x^2}}{2\sqrt{x}} - \frac{x\sqrt{x}}{\sqrt{625 - x^2}}$
 3.3.4. $\frac{-1}{x^{19}\sqrt{625 - x^2}} - \frac{20\sqrt{625 - x^2}}{x^{21}}$
 3.3.5. $f' = 4(2x - 3), y = 4x - 7$
 3.4.1. $\frac{3x^2}{x^3 - 5x + 10} - \frac{x^3(3x^2 - 5)}{(x^3 - 5x + 10)^2}$
 3.4.2. $\frac{2x + 5}{x^3 - 6x^3 + 3x^2 - 7x + 1} - \frac{(x^2 + 5x - 3)(5x^4 - 18x^2 + 6x - 7)}{(x^5 - 6x^3 + 3x^2 - 7x + 1)^2}$
 3.4.3. $\frac{1}{2\sqrt{x}\sqrt{625 - x^2}} + \frac{x^{3/2}}{(625 - x^2)^{3/2}}$
 3.4.4. $\frac{-1}{x^{19}\sqrt{625 - x^2}} - \frac{20\sqrt{625 - x^2}}{x^{21}}$
 3.4.5. $y = 17x/4 - 41/4$
 3.4.6. $y = 11x/16 - 15/16$
 3.4.8. $y = 19/169 - 5x/338$
 3.4.9. $13/18$
 3.5.1. $4x^3 - 9x^2 + x + 7$
 3.5.2. $3x^2 - 4x + 2/\sqrt{x}$
 3.5.3. $6(x^2 + 1)^2x$

- 3.5.4. $\sqrt{169 - x^2} - x^2/\sqrt{169 - x^2}$
 3.5.5. $(2x - 4)\sqrt{25 - x^2} - (x^2 - 4x + 5)x/\sqrt{25 - x^2}$
 3.5.6. $-x/\sqrt{r^2 - x^2}$
 3.5.7. $2x^3/\sqrt{1 + x^4}$
 3.5.8. $\frac{1}{4\sqrt{x}(5 - \sqrt{x})^{3/2}}$
 3.5.9. $6 + 18x$
 3.5.10. $\frac{2x + 1}{1 - x} + \frac{x^2 + x + 1}{(1 - x)^2}$
 3.5.11. $-1/\sqrt{25 - x^2} - \sqrt{25 - x^2}/x^2$
 3.5.12. $\frac{1}{2} \left(\frac{-169}{x^2} - 1 \right) / \sqrt{\frac{169}{x} - x}$
 3.5.13. $\frac{3x^2 - 2x + 1/x^2}{2\sqrt{x^3 - x^2 - (1/x)}}$
 3.5.14. $\frac{300x}{(100 - x^2)^{5/2}}$
 3.5.15. $\frac{1 + 3x^2}{3(x + x^3)^{2/3}}$
 3.5.16. $\left(4x(x^2 + 1) + \frac{4x^3 + 4x}{2\sqrt{1 + (x^2 + 1)^2}} \right) / 2\sqrt{(x^2 + 1)^2 + \sqrt{1 + (x^2 + 1)^2}}$
 3.5.17. $5(x + 8)^4$
 3.5.18. $-3(4 - x)^2$
 3.5.19. $6x(x^2 + 5)^2$
 3.5.20. $-12x(6 - 2x^2)^2$
 3.5.21. $24x^2(1 - 4x^3)^{-3}$
 3.5.22. $5 + 5/x^2$
 3.5.23. $-8(4x - 1)(2x^2 - x + 3)^{-3}$
 3.5.24. $1/(x + 1)^2$
 3.5.25. $3(8x - 2)/(4x^2 - 2x + 1)^2$
 3.5.26. $-3x^2 + 5x - 1$

- 3.5.27. $6x(2x - 4)^3 + 6(3x^2 + 1)(2x - 4)^2$
 3.5.28. $-2/(x - 1)^2$
 3.5.29. $4x/(x^2 + 1)^2$
 3.5.30. $(x^2 - 6x + 7)/(x - 3)^2$
 3.5.31. $-5/(3x - 4)^2$
 3.5.32. $60x^4 + 72x^3 + 18x^2 + 18x - 6$
 3.5.33. $(5 - 4x)/((2x + 1)^2(x - 3)^2)$
 3.5.34. $1/(2(2 + 3x)^2)$
 3.5.35. $56x^6 + 72x^5 + 110x^4 + 100x^3 + 60x^2 + 28x + 6$
 3.5.36. $y = 23x/96 - 29/96$
 3.5.37. $y = 3 - 2x/3$
 3.5.38. $y = 13x/2 - 23/2$
 3.5.39. $y = 2x - 11$
 3.5.40. $y = \frac{20 + 2\sqrt{5}}{5\sqrt{4 + \sqrt{5}}}x + \frac{3\sqrt{5}}{5\sqrt{4 + \sqrt{5}}}$
 4.1.1. $2n\pi - \pi/2$, any integer n
 4.1.2. $n\pi \pm \pi/6$, any integer n
 4.1.3. $(\sqrt{2} + \sqrt{6})/4$
 4.1.4. $-(1 + \sqrt{3})/(1 - \sqrt{3}) = 2 + \sqrt{3}$
 4.1.11. $t = \pi/2$
 4.3.1. 5
 4.3.2. $7/2$
 4.3.3. $3/4$
 4.3.4. 1
 4.3.5. $-\sqrt{2}/2$
 4.3.6. 7
 4.3.7. 2
 4.4.1. $\sin(\sqrt{x})\cos(\sqrt{x})/\sqrt{x}$
 4.4.2. $\frac{\sin x}{2\sqrt{x}} + \sqrt{x}\cos x$
 4.4.3. $-\frac{\cos x}{\sin^2 x}$
 4.4.4. $\frac{(2x + 1)\sin x - (x^2 + x)\cos x}{\sin^2 x}$
 4.4.5. $\frac{-\sin x \cos x}{\sqrt{1 - \sin^2 x}}$
 4.5.1. $\cos^2 x - \sin^2 x$
 4.5.2. $-\sin x \cos(\cos x)$
 4.5.3. $\frac{\tan x + x \sec^2 x}{2\sqrt{x} \tan x}$
 4.5.4. $\frac{\sec^2 x(1 + \sin x) - \tan x \cos x}{(1 + \sin x)^2}$
 4.5.5. $-csc^2 x$
 4.5.6. $-csc x \cot x$
 4.5.7. $3x^2 \sin(23x^2) + 46x^4 \cos(23x^2)$
 4.5.8. 0
 4.5.9. $-6 \cos(\cos(6x)) \sin(6x)$
 4.5.10. $\frac{\sec \theta \tan \theta}{(1 + \sec \theta)^2} = \frac{\sin \theta}{(\cos \theta + 1)^2}$
 4.5.11. $5t^4 \cos(6t) - 6t^5 \sin(6t)$
 4.5.12. $3t^2(\sin(3t) + t \cos(3t))/\cos(2t) + 2t^3 \sin(3t) \sin(2t)/\cos^2(2t)$
 4.5.13. $n\pi/2$, any integer n
 4.5.14. $\pi/2 + n\pi$, any integer n
 4.5.15. $y = \sqrt{3}x/2 + 3/4 - \sqrt{3}\pi/6$
 4.5.16. $y = 8\sqrt{3}x + 4 - 8\sqrt{3}\pi/3$
 4.5.17. $y = 3\sqrt{3}x/2 - \sqrt{3}\pi/4$
 4.5.18. $\pi/6 + 2n\pi, 5\pi/6 + 2n\pi$, any integer n
 4.6.1. x/y
 4.6.2. $-(2x + y)/(x + 2y)$
 4.6.3. $(2xy - 3x^2 - y^2)/(2xy - 3y^2 - x^2)$
 4.6.4. $\sin(x)\sin(y)/(\cos(x)\cos(y))$
 4.6.5. $-\sqrt{y}/\sqrt{x}$
 4.6.6. $(y \sec^2(x/y) - y^2)/(x \sec^2(x/y) + y^2)$

- 4.6.7. $(y - \cos(x+y))/(\cos(x+y) - x)$
 4.6.8. $-y^2/x^2$
 4.6.9. 1
 4.6.12. $y = 2x \pm 6$
 4.6.13. $y = x/2 \pm 3$
 4.6.14. $(\sqrt{3}, 2\sqrt{3}), (-\sqrt{3}, -2\sqrt{3}),$
 $(2\sqrt{3}, \sqrt{3}), (-2\sqrt{3}, -\sqrt{3})$
 4.6.15. $y = 7x/\sqrt{3} - 8/\sqrt{3}$
 4.6.16. $y = (-y_1^{1/3}x + y_1^{1/3}x_1 + x_1^{1/3}y_1)/x_1^{1/3}$
 4.6.17. $(y - y_1) = \frac{(2x_1^3 + 2x_1y_1^2 - x_1)}{(2y_1^3 + 2y_1x_1^2 + y_1)}(x - x_1)$
 4.7.1. 0
 4.7.2. 1
 4.7.3. 1/6
 4.7.4. $-\infty$
 4.7.5. 1/16
 4.7.6. 1/3
 4.7.7. 0
 4.7.8. 3/2
 4.7.9. $-1/4$
 4.7.10. -3
 4.7.11. 1/2
 4.7.12. 0
 4.7.13. -1
 4.7.14. $-1/2$
 4.7.15. 5
 4.7.16. ∞
 4.7.17. ∞
 4.7.18. 2/7
 4.7.19. 2
 4.7.20. $-\infty$
 4.7.21. 1
 4.7.22. 0
 4.7.23. ∞
 4.7.24. 1/2
 4.7.25. 0
 4.7.26. 1/2
 4.7.27. 5
 4.7.28. $2\sqrt{2}$
 4.7.29. $-1/2$
 4.7.30. 2
 4.7.31. 0
 4.7.32. ∞
 4.7.33. 0
 4.7.34. 3/2
 4.7.35. ∞
 4.7.36. 5
 4.7.37. $-1/2$
 4.7.38. does not exist
 4.7.39. ∞
 4.7.40. $y = 1$ and $y = -1$
 5.1.1. min at $x = 1/2$
 5.1.2. min at $x = -1$, max at $x = 1$
 5.1.3. max at $x = 2$, min at $x = 4$
 5.1.4. min at $x = \pm 1$, max at $x = 0$.
 5.1.5. min at $x = 1$
 5.1.6. none
 5.1.7. none
 5.1.8. min at $x = 7\pi/12 + k\pi$, max at $x = -\pi/12 + k\pi$, for integer k .
 5.1.9. none
 5.1.10. local max at $x = 5$
 5.1.11. local min at $x = 49$

- 5.1.12. local min at $x = 0$
 5.1.15. one
 5.2.1. min at $x = 1/2$
 5.2.2. min at $x = -1$, max at $x = 1$
 5.2.3. max at $x = 2$, min at $x = 4$
 5.2.4. min at $x = \pm 1$, max at $x = 0$.
 5.2.5. min at $x = 1$
 5.2.6. none
 5.2.7. none
 5.2.8. min at $x = 7\pi/12 + k\pi$, max at $x = -\pi/12 + k\pi$, for integer k .
 5.2.9. none
 5.2.10. max at $x = 0$, min at $x = \pm 11$
 5.2.11. min at $x = -3/2$, neither at $x = 0$
 5.2.13. min at $n\pi$, max at $\pi/2 + n\pi$
 5.2.14. min at $2n\pi$, max at $(2n+1)\pi$
 5.2.15. min at $\pi/2 + 2n\pi$, max at $3\pi/2 + 2n\pi$
 5.3.1. min at $x = 1/2$
 5.3.2. min at $x = -1$, max at $x = 1$
 5.3.3. max at $x = 2$, min at $x = 4$
 5.3.4. min at $x = \pm 1$, max at $x = 0$.
 5.3.5. min at $x = 1$
 5.3.6. none
 5.3.7. none
 5.3.8. min at $x = 7\pi/12 + n\pi$, max at $x = -\pi/12 + n\pi$, for integer n .
 5.3.9. max at $x = 63/64$
 5.3.10. max at $x = 7$
 5.3.11. max at $-5^{-1/4}$, min at $5^{-1/4}$
 5.3.12. none
 5.3.13. max at -1 , min at 1
 5.3.14. min at $2^{-1/3}$
 5.3.15. none
 5.3.16. min at $n\pi$
 5.3.17. max at $n\pi$, min at $\pi/2 + n\pi$
 5.3.18. max at $\pi/2 + 2n\pi$, min at $3\pi/2 + 2n\pi$
 5.4.1. concave up everywhere
 5.4.2. concave up when $x < 0$, concave down when $x > 0$
 5.4.3. concave down when $x < 3$, concave up when $x > 3$
 5.4.4. concave up when $x < -1/\sqrt{3}$ or $x > 1/\sqrt{3}$, concave down when $-1/\sqrt{3} < x < 1/\sqrt{3}$
 5.4.5. concave up when $x < 0$ or $x > 2/3$, concave down when $0 < x < 2/3$
 5.4.6. concave up when $x < 0$, concave down when $x > 0$
 5.4.7. concave up when $x < -1$ or $x > 1$, concave down when $-1 < x < 0$ or $0 < x < 1$
 5.4.8. concave down on $((8n-1)\pi/4, (8n+3)\pi/4)$, concave up on $((8n+3)\pi/4, (8n+7)\pi/4)$, for integer n
 5.4.9. concave down everywhere
 5.4.10. concave up on $(-\infty, (21 - \sqrt{497})/4)$ and $(21 + \sqrt{497})/4, \infty)$
 5.4.11. concave up on $(0, \infty)$
 5.4.12. concave down on $(2n\pi/3, (2n+1)\pi/3)$
 5.4.13. concave up on $(0, \infty)$
 5.4.14. concave up on $(-\infty, -1)$ and $(0, \infty)$
 5.4.15. concave down everywhere
 5.4.16. concave up everywhere
 5.4.17. concave up on $(\pi/4 + n\pi, 3\pi/4 + n\pi)$

- 5.4.18. inflection points at $n\pi$,
 $\pm \arcsin(\sqrt{2/3}) + n\pi$
 5.4.19. up/incr: $(3, \infty)$, up/decr: $(-\infty, 0)$,
 $(2, 3)$, down/decr: $(0, 2)$
 6.1.1. max at $(2, 5)$, min at $(0, 1)$
 6.1.2. 25×25
 6.1.3. $P/4 \times P/4$
 6.1.4. $w = l = 2 \cdot 5^{2/3}$, $h = 5^{2/3}$, $h/w = 1/2$
 6.1.5. $\sqrt[3]{100} \times \sqrt[3]{100} \times 2\sqrt[3]{100}$, $h/s = 2$
 6.1.6. $w = l = 2^{1/3}V^{1/3}$, $h = V^{1/3}/2^{2/3}$,
 $h/w = 1/2$
 6.1.7. 1250 square feet
 6.1.8. $l^2/8$ square feet
 6.1.9. \$5000
 6.1.10. 100
 6.1.11. r^2
 6.1.12. $h/r = 2$
 6.1.13. $h/r = 2$
 6.1.14. $r = 5$ cm, $h = 40/\pi$ cm, $h/r = 8/\pi$
 6.1.15. $8/\pi$
 6.1.16. 4/27
 6.1.17. Go direct from A to D .
 6.1.18. (a) 2, (b) 7/2
 6.1.19. $\frac{\sqrt{3}}{6} \times \frac{\sqrt{3}}{6} + \frac{1}{2} \times \frac{1}{4} - \frac{\sqrt{3}}{12}$
 6.1.20. (a) $a/6$, (b) $(a + b - \sqrt{a^2 - ab + b^2})/6$
 6.1.21. 1.5 meters wide by 1.25 meters tall
 6.1.22. If $k \leq 2/\pi$ the ratio is $(2 - k\pi)/4$;
 if $k \geq 2/\pi$, the ratio is zero: the window should be semicircular with no rectangular part.
 6.1.23. a/b
 6.1.24. $w = 2r/\sqrt{3}$, $h = 2\sqrt{2}r/\sqrt{3}$
 6.1.25. $1/\sqrt{3} \approx 58\%$
 6.1.26. $18 \times 18 \times 36$
 6.1.27. $r = 5/(2\pi)^{1/3} \approx 2.7$ cm,
 $h = 5 \cdot 2^{5/3}/\pi^{1/3} \approx 4r \approx 10.8$ cm
 6.1.28. $h = \frac{750}{\pi} \left(\frac{2\pi^2}{750^2} \right)^{1/3}$, $r = \left(\frac{750^2}{2\pi^2} \right)^{1/6}$
 6.1.29. $h/r = \sqrt{2}$
 6.1.30. The ratio of the volume of the sphere to the volume of the cone is $1033/4096 + 33/4096\sqrt{17} \approx 0.2854$, so the cone occupies approximately 28.54% of the sphere.
 6.1.31. P should be at distance $c\sqrt{a}/(\sqrt[3]{a} + \sqrt[3]{b})$ from charge A .
 6.1.32. 1/2
 6.1.33. \$7000
 6.1.34. There is a critical point when $\sin\theta_1/v_1 = \sin\theta_2/v_2$, and the second derivative is positive, so there is a minimum at the critical point.
 6.2.1. $1/(16\pi)$ cm/s
 6.2.2. $3/(1000\pi)$ meters/second
 6.2.3. 1/4 m/s
 6.2.4. 6/25 m/s
 6.2.5. 80π mi/min
 6.2.6. $3\sqrt{5}$ ft/s
 6.2.7. $20/(3\pi)$ cm/s
 6.2.8. 13/20 ft/s

- 6.2.9. $5\sqrt{10}/2$ m/s
 6.2.10. $75/64$ m/min
 6.2.11. $145\pi/72$ m/s
 6.2.12. $25\pi/144$ m/min
 6.2.13. $\pi\sqrt{2}/36$ ft³/s
 6.2.14. tip: 6 ft/s, length: 5/2 ft/s
 6.2.15. tip: 20/11 m/s, length: 9/11 m/s
 6.2.16. $380/\sqrt{3} - 150 \approx 69.4$ mph
 6.2.17. $500/\sqrt{3} - 200 \approx 88.7$ km/hr
 6.2.18. 18 m/s
 6.2.19. $136\sqrt{475}/19 \approx 156$ km/hr
 6.2.20. -50 m/s
 6.2.21. 68 m/s
 6.2.22. $3800/\sqrt{329} \approx 210$ km/hr
 6.2.23. $820/\sqrt{329} + 150\sqrt{57}/\sqrt{47} \approx 210$ km/hr
 6.2.24. 4000/49 m/s
 6.2.25. (a) $x = a \cos\theta - a \sin\theta \cot(\theta + \beta) = a \sin\beta/\sin(\theta + \beta)$, (c) $\dot{x} \approx 3.79$ cm/s
 6.3.1. $x_3 = 1.475773162$
 6.3.2. 2.15
 6.3.3. 3.36
 6.3.4. 2.19 or 1.26
 6.4.1. $\Delta y = 65/16$, $dy = 2$
 6.4.2. $\Delta y = \sqrt{11/10} - 1$, $dy = 0.05$
 6.4.3. $\Delta y = \sin(\pi/50)$, $dy = \pi/50$
 6.4.4. $dV = 8\pi/25$
 6.5.1. $c = 1/2$
 6.5.2. $c = \sqrt{18} - 2$
 6.5.6. $x^3/3 + 47x^2/2 - 5x + k$
 6.5.7. $-\cos(2x)/2 + k$
 7.1.1. 10
 7.1.2. 35/3
 7.1.3. x^2
 7.1.4. $2x^2$
 7.1.5. $2x^2 - 8$
 7.1.6. $2b^2 - 2a^2$
 7.1.7. 4 rectangles: $41/4 = 10.25$,
 8 rectangles: $183/16 = 11.4375$
 7.1.8. 23/4
 7.2.1. $(16/3)x^{3/2} + C$
 7.2.2. $t^3 + t + C$
 7.2.3. $8\sqrt{x} + C$
 7.2.4. $-2/z + C$
 7.2.5. $(5x+1)^3/15 + C$
 7.2.6. $(x-6)^3/3 + C$
 7.2.7. $2x^{5/2}/5 + C$
 7.2.8. $-4/\sqrt{x} + C$
 7.2.9. $4t - t^2 + C$, $t < 2$; $t^2 - 4t + 8 + C$,
 $t \geq 2$
 7.2.10. 87/2
 7.2.11. 2
 7.2.12. $3^4/4$
 7.2.13. $2^6/6 - 1/6$
 7.2.14. $x^2 - 3x$
 7.2.15. $2x(x^4 - 3x^2)$
 7.2.16. $\tan(x^2)$
 7.2.17. $2x \tan(x^4)$
 7.3.1. It rises until $t = 100/49$, then falls. The position of the object at time t is $s(t) = -4.9t^2 + 20t + k$. The net distance traveled is $-45/2$, that is, it ends up 45/2 meters below where it started. The total distance traveled is 6205/98 meters.

- 7.3.2. $\int_0^{2\pi} \sin t \, dt = 0$
- 7.3.3. net: 2π , total: $2\pi/3 + 4\sqrt{3}$
- 7.3.4. 8
- 7.3.5. $17/3$
- 7.3.6. $A = 18$, $B = 44/3$, $C = 10/3$
- 7.4.1. $-(1-t)^{10}/10 + C$
- 7.4.2. $x^5/5 + 2x^3/3 + x + C$
- 7.4.3. $(x^2 + 1)^{101}/202 + C$
- 7.4.4. $-3(1-5t)^{2/3}/10 + C$
- 7.4.5. $(\sin^4 x)/4 + C$
- 7.4.6. $-(100 - x^2)^{3/2}/3 + C$
- 7.4.7. $-2\sqrt{1-x^3}/3 + C$
- 7.4.8. $\sin(\sin \pi t)/\pi + C$
- 7.4.9. $1/(2 \cos^2 x) = (1/2) \sec^2 x + C$
- 7.4.10. $-\ln |\cos x| + C$
- 7.4.11. 0
- 7.4.12. $\tan^2(x)/2 + C$
- 7.4.13. $1/4$
- 7.4.14. $-\cos(\tan x) + C$
- 7.4.15. $1/10$
- 7.4.16. $\sqrt{3}/4$
- 7.4.17. $(27/8)(x^2 - 7)^{8/9} + C$
- 7.4.18. $-(3^7 + 1)/14$
- 7.4.19. 0
- 7.4.20. $f(x)^2/2$
- 8.1.1. $8\sqrt{2}/15$
- 8.1.2. $1/12$
- 8.1.3. $9/2$
- 8.1.4. $4/3$
- 8.1.5. $2/3 - 2/\pi$
- 8.1.6. $3/\pi - 3\sqrt{3}/(2\pi) - 1/8$
- 8.1.7. $1/3$
- 8.1.8. $10\sqrt{5}/3 - 6$
- 8.1.9. $500/3$
- 8.1.10. 2
- 8.1.11. $1/5$
- 8.1.12. $1/6$
- 8.2.1. $1/\pi$, $5/\pi$
- 8.2.2. 0, 245
- 8.2.3. 20, 28
- 8.2.4. $(3 - \pi)/(2\pi)$, $(18 - 12\sqrt{3} + \pi)/(4\pi)$
- 8.2.5. 10/49 meters, 20/49 seconds
- 8.2.6. 45/98 meters, 30/49 seconds
- 8.2.7. 25000/49 meters, 1000/49 seconds
- 8.2.8. $s(t) = \cos t$, $v(t) = -\sin t$, maximum distance is 1, maximum speed is 1
- 8.2.9. $s(t) = -\sin(\pi t)/\pi^2 + t/\pi$, $v(t) = -\cos(\pi t)/\pi + 1/\pi$, maximum speed is $2/\pi$
- 8.2.10. $s(t) = t^2/2 - \sin(\pi t)/\pi^2 + t/\pi$, $v(t) = t - \cos(\pi t)/\pi + 1/\pi$
- 8.2.11. $s(t) = t^2/2 + \sin(\pi t)/\pi^2 - t/\pi$, $v(t) = t + \cos(\pi t)/\pi - 1/\pi$
- 8.3.5. $8\pi/3$
- 8.3.6. $\pi/30$
- 8.3.7. $\pi(\pi/2 - 1)$
- 8.3.8. (a) $114\pi/5$ (b) $74\pi/5$ (c) 20π (d) 4π
- 8.3.9. 16π , 24π
- 8.3.11. $\pi h^2(3r - h)/3$
- 8.3.13. 2π
- 8.4.1. $2/\pi$; $2/\pi$; 0
- 8.4.2. $4/3$
- 8.4.3. $1/4$
- 8.4.4. $\pi/4$
- 8.4.5. $-1/3$, 1
- 8.4.6. $-4\sqrt{1224} \text{ ft/s}$; $-8\sqrt{1224} \text{ ft/s}$
- 8.5.1. $\approx 5, 305, 028, 516 \text{ N}\cdot\text{m}$
- 8.5.2. $\approx 4, 457, 854, 041 \text{ N}\cdot\text{m}$
- 8.5.3. $367, 500\pi \text{ N}\cdot\text{m}$
- 8.5.4. $49000\pi + 196000/3 \text{ N}\cdot\text{m}$
- 8.5.5. $2450\pi \text{ N}\cdot\text{m}$
- 8.5.6. $0.05 \text{ N}\cdot\text{m}$
- 8.5.7. $6/5 \text{ N}\cdot\text{m}$
- 8.5.8. $3920 \text{ N}\cdot\text{m}$
- 8.5.9. $23520 \text{ N}\cdot\text{m}$
- 8.5.10. $12740 \text{ N}\cdot\text{m}$
- 9.5.3. $\frac{-1}{1+x^2}$
- 9.5.5. $\frac{2x}{\sqrt{1-x^2}}$
- 9.5.6. $\frac{e^x}{1+e^{2x}}$
- 9.5.7. $-3x^2 \cos(x^3)/\sqrt{1-\sin^2(x^3)}$
- 9.5.8. $\frac{2}{(\arcsin x)\sqrt{1-x^2}}$
- 9.5.9. $-e^x/\sqrt{1-e^{2x}}$
- 9.5.10. 0
- 9.5.11. $\frac{(1+\ln x)x^x}{\ln 5(1+x^{2x}) \arctan(x^x)}$
- 10.1.1. $x/2 - \sin(2x)/4 + C$
- 10.1.2. $-\cos x + (\cos^3 x)/3 + C$
- 10.1.3. $3x/8 - (\sin 2x)/4 + (\sin 4x)/32 + C$
- 10.1.4. $(\cos^5 x)/5 - (\cos^3 x)/3 + C$
- 10.1.5. $\sin x - (\sin^3 x)/3 + C$
- 10.1.6. $x/8 - (\sin 4x)/32 + C$
- 10.1.7. $(\sin^3 x)/3 - (\sin^5 x)/5 + C$
- 10.1.8. $-2(\cos x)^{5/2}/5 + C$
- 10.1.9. $\tan x - \cot x + C$
- 10.1.10. $(\sec^3 x)/3 - \sec x + C$
- 10.2.1. $-\ln |\csc x + \cot x| + C$
- 10.2.2. $-\csc x \cot x/2 - (1/2) \ln |\csc x + \cot x| + C$
- 10.2.3. $x\sqrt{x^2-1}/2 - \ln|x+\sqrt{x^2-1}|/2 + C$
- 10.2.4. $x\sqrt{9+4x^2}/2 + (9/4) \ln|2x+\sqrt{9+4x^2}| + C$
- 10.2.5. $-(1-x^2)^{3/2}/3 + C$
- 10.2.6. $\arcsin(x)/8 - \sin(4 \arcsin x)/32 + C$
- 10.2.7. $\ln|x+\sqrt{1+x^2}| + C$
- 10.2.8. $(x+1)\sqrt{x^2+2x}/2 - \ln|x+1+\sqrt{x^2+2x}|/2 + C$
- 10.2.9. $-\arctan x - 1/x + C$
- 10.2.10. $2 \arcsin(x/2) - x\sqrt{4-x^2}/2 + C$
- 10.2.11. $\arcsin(\sqrt{x}) - \sqrt{x}\sqrt{1-x} + C$
- 10.2.12. $(2x^2+1)\sqrt{4x^2-1}/24 + C$
- 10.3.1. $\cos x + x \sin x + C$
- 10.3.2. $x^2 \sin x - 2 \sin x + 2x \cos x + C$
- 10.3.3. $(x-1)e^x + C$
- 10.3.4. $(1/2)e^{x^2} + C$
- 10.3.5. $(x/2) - \sin(2x)/4 + C = (x/2) - (\sin x \cos x)/2 + C$
- 10.3.6. $x \ln x - x + C$
- 10.3.7. $(x^2 \arctan x + \arctan x - x)/2 + C$
- 10.3.8. $-x^3 \cos x + 3x^2 \sin x + 6x \cos x - 6 \sin x + C$
- 10.3.9. $x^3 \sin x + 3x^2 \cos x - 6x \sin x - 6 \cos x + C$

- 10.3.10. $x^2/4 - (\cos^2 x)/4 - (x \sin x \cos x)/2 + C$
- 10.3.11. $x/4 - (x \cos^2 x)/2 + (\cos x \sin x)/4 + C$
- 10.3.12. $x \arctan(\sqrt{x}) + \arctan(\sqrt{x}) - \sqrt{x} + C$
- 10.3.13. $2 \sin(\sqrt{x}) - 2\sqrt{x} \cos(\sqrt{x}) + C$
- 10.3.14. $\sec x \csc x - 2 \cot x + C$
- 10.4.1. $-\ln|x-2|/4 + \ln|x+2|/4 + C$
- 10.4.2. $-x^3/3 - 4x - 4 \ln|x-2| + 4 \ln|x+2| + C$
- 10.4.3. $-1/(x+5) + C$
- 10.4.4. $-x - \ln|x-2| + \ln|x+2| + C$
- 10.4.5. $-4x + x^3/3 + 8 \arctan(x/2) + C$
- 10.4.6. $(1/2) \arctan(x/2 + 5/2) + C$
- 10.4.7. $x^2/2 - 2 \ln(4+x^2) + C$
- 10.4.8. $(1/4) \ln|x+3| - (1/4) \ln|x+7| + C$
- 10.4.9. $(1/5) \ln|2x-3| - (1/5) \ln|1+x| + C$
- 10.4.10. $(1/3) \ln|x-1| - (1/3) \ln|x+3| + C$
- 10.5.1. T: S; 4 \pm 0
- 10.5.2. T: 9.281125 \pm 0.281125; S: 9 \pm 0
- 10.5.3. T: 60.75 \pm 1; S: 60 \pm 0
- 10.5.4. T: 1.1167 \pm 0.0833; S: 1.1000 \pm 0.0167
- 10.5.5. T: 0.3235 \pm 0.0026; S: 0.3217 \pm 0.000065
- 10.5.6. T: 0.6478 \pm 0.0052; S: 0.6438 \pm 0.000033
- 10.5.7. T: 2.8833 \pm 0.0834; S: 2.9000 \pm 0.0167
- 10.5.8. T: 1.1170 \pm 0.0077; S: 1.1114 \pm 0.0002
- 10.5.9. T: 1.097 \pm 0.0147; S: 1.089 \pm 0.0003
- 10.5.10. T: 3.63 \pm 0.087; S: 3.62 \pm 0.032
- 10.6.1. $\frac{(t+4)^4}{4} + C$
- 10.6.2. $\frac{(t^2-9)^{5/2}}{5} + C$
- 10.6.3. $\frac{(e^{t^2}+16)^2}{4} + C$
- 10.6.4. $\cos t - \frac{2}{3} \cos^3 t + C$
- 10.6.5. $\frac{\tan^2 t}{2} + C$
- 10.6.6. $\ln|t^2+t+3| + C$
- 10.6.7. $\frac{1}{8} \ln|1-4/t^2| + C$
- 10.6.8. $\frac{1}{25} \tan(\arcsin(t/5)) + C = \frac{t}{25\sqrt{25-t^2}} + C$
- 10.6.9. $\frac{2}{3} \sqrt{\sin 3t} + C$
- 10.6.10. $t \tan t + \ln |\cos t| + C$
- 10.6.11. $2\sqrt{e^t+1} + C$
- 10.6.12. $\frac{3t}{8} + \frac{\sin 2t}{4} + \frac{\sin 4t}{32} + C$
- 10.6.13. $\frac{\ln|t|}{3} - \frac{\ln|t+3|}{3} + C$
- 10.6.14. $\frac{-1}{\sin \arctan t} + C = -\sqrt{1+t^2}/t + C$
- 10.6.15. $\frac{-1}{2(1+\tan t)^2} + C$
- 10.6.16. $\frac{(t^2+1)^{5/2}}{5} - \frac{(t^2+1)^{3/2}}{3} + C$
- 10.6.17. $\frac{e^t \sin t - e^t \cos t}{2} + C$
- 10.6.18. $\frac{(t^{3/2}+47)^4}{6} + C$
- 10.6.19. $\frac{2}{3(2-t^2)^{3/2}} - \frac{1}{(2-t^2)^{1/2}} + C$
- 10.6.20. $\frac{\ln|\sin(\arctan(2t/3))|}{9} + C = \frac{\ln(4t^2) - \ln(9+4t^2)}{18} + C$
- 10.6.21. $\frac{(\arctan(2t))^2}{4} + C$
- 10.6.22. $\frac{3 \ln|t+3|}{4} + \frac{\ln|t-1|}{4} + C$
- 10.6.23. $\frac{\cos^7 t}{7} - \frac{\cos^5 t}{5} + C$
- 10.6.24. $\frac{-1}{t-3} + C$
- 10.6.25. $\frac{-1}{\ln t} + C$
- 10.6.26. $\frac{t^2(\ln t)^2}{2} - \frac{t^2 \ln t}{2} + \frac{t^2}{4} + C$
- 10.6.27. $(t^3 - 3t^2 + 6t - 6)e^t + C$
- 10.6.28. $\frac{5+\sqrt{5}}{10} \ln(2t+1-\sqrt{5}) + \frac{5-\sqrt{5}}{10} \ln(2t+1+\sqrt{5}) + C$
- 11.1.1. $15/2$
- 11.1.2. 5
- 11.1.3. $16/5$
- 11.1.5. $\bar{x} = 45/28$, $\bar{y} = 93/70$
- 11.1.6. $\bar{x} = 0$, $\bar{y} = 4/(3\pi)$
- 11.1.7. $\bar{x} = 1/2$, $\bar{y} = 2/5$
- 11.1.8. $\bar{x} = 0$, $\bar{y} = 8/5$
- 11.1.9. $\bar{x} = 4/7$, $\bar{y} = 2/5$
- 11.1.10. $\bar{x} = \bar{y} = 1/5$
- 11.1.11. $\bar{x} = 0$, $\bar{y} = 28/(9\pi)$
- 11.1.12. $\bar{x} = \bar{y} = 28/(9\pi)$
- 11.1.13. $\bar{x} = 0$, $\bar{y} = 244/(27\pi) \approx 2.88$
- 11.2.1. ∞
- 11.2.2. $1/2$
- 11.2.3. diverges
- 11.2.4. diverges
- 11.2.5. 1
- 11.2.6. diverges
- 11.2.7. 2
- 11.2.8. diverges
- 11.2.9. $\pi/6$
- 11.2.10. diverges, 0
- 11.2.11. diverges, 0
- 11.2.12. diverges, no CPV
- 11.2.13. π
- 11.2.14. 80 mph: 90.8 to 95.3 N-m
90 mph: 114.9 to 120.6 N-m
100.9 mph: 144.5 to 151.6 N-m
- 11.3.2. $\mu = 1/c$, $\sigma = 1/c$
- 11.3.3. $\mu = (a+b)/2$, $\sigma = \frac{(b-a)}{2\sqrt{3}}$
- 11.3.4. $7/2$
- 11.3.5. $21/2$
- 11.3.9. $r = 6$
- 11.4.1. $(22\sqrt{22} - 8)/27$
- 11.4.2. $\ln(2) + 3/8$
- 11.4.3. $a + a^3/3$
- 11.4.4. $\ln((\sqrt{2}+1)/\sqrt{3})$
- 11.4.6. $3/4$
- 11.4.7. ≈ 3.82
- 11.4.8. ≈ 1.01
- 11.4.9. $\sqrt{1+e^2} - \sqrt{2} + 1 - \ln(\sqrt{1+e^2} + 1) + \ln(\sqrt{2} + 1)$
- 11.5.1. $8\pi\sqrt{3} - \frac{16\pi\sqrt{2}}{3}$
- 11.5.3. $\frac{730\pi\sqrt{730}}{27} - \frac{10\pi\sqrt{10}}{27}$
- 11.5.4. $\pi + 2\pi e + \frac{1}{4}\pi e^2 - \frac{\pi}{4e^2} - \frac{2\pi}{e}$
- 11.5.6. $8\pi^2$
- 11.5.7. $2\pi + \frac{8\pi^2}{3\sqrt{3}}$

- 11.5.8. $a > b$: $2\pi b^2 + \frac{2\pi a^2 b}{\sqrt{a^2 - b^2}} \arcsin(\sqrt{a^2 - b^2}/a)$,
 $a < b$: $2\pi b^2 + \frac{2\pi a^2 b}{\sqrt{b^2 - a^2}} \ln\left(\frac{b}{a} + \frac{\sqrt{b^2 - a^2}}{a}\right)$
- 12.1.2. $\theta = \arctan(3)$
 12.1.3. $r = -4 \csc \theta$
 12.1.4. $r^3 \cos \theta \sin^2 \theta = 1$
 12.1.5. $r = \sqrt{5}$
 12.1.6. $r^2 = \sin \theta \sec^3 \theta$
 12.1.7. $r \sin \theta = \sin(r \cos \theta)$
 12.1.8. $r = 2/(\sin \theta - 5 \cos \theta)$
 12.1.9. $r = 2 \sec \theta$
 12.1.10. $0 = r^2 \cos^2 \theta - r \sin \theta + 1$
 12.1.11. $0 = 3r^2 \cos^2 \theta - 2r \cos \theta - r \sin \theta$
 12.1.12. $r = \sin \theta$
 12.1.21. $(x^2 + y^2)^2 = 4x^2 y - (x^2 + y^2)y$
 12.1.22. $(x^2 + y^2)^{3/2} = y^2$
 12.1.23. $x^2 + y^2 = x^2 y^2$
 12.1.24. $x^4 + x^2 y^2 = y^2$
- 12.2.1. $(\theta \cos \theta + \sin \theta)/(-\theta \sin \theta + \cos \theta)$,
 $(\theta^2 + 2)/(-\theta \sin \theta + \cos \theta)^3$
- 12.2.2. $\frac{\cos \theta + 2 \sin \theta \cos \theta}{\cos^2 \theta - \sin^2 \theta - \sin \theta}$,
 $\frac{3(1 + \sin \theta)}{(\cos^2 \theta - \sin^2 \theta - \sin \theta)^3}$
- 12.2.3. $(\sin^2 \theta - \cos^2 \theta)/(2 \sin \theta \cos \theta)$,
 $-1/(4 \sin^3 \theta \cos^3 \theta)$
- 12.2.4. $\frac{2 \sin \theta \cos \theta}{\cos^2 \theta - \sin^2 \theta}$, $\frac{2}{(\cos^2 \theta - \sin^2 \theta)^3}$
- 12.2.5. undefined

- 12.2.6. $\frac{2 \sin \theta - 3 \sin^3 \theta}{3 \cos^3 \theta - 2 \cos \theta}$,
 $\frac{3 \cos^4 \theta - 3 \cos^2 \theta + 2}{2 \cos^3 \theta (3 \cos^2 \theta - 2)^3}$
- 12.3.1. 1
 12.3.2. $9\pi/2$
 12.3.3. $\sqrt{3}/3$
 12.3.4. $\pi/12 + \sqrt{3}/16$
 12.3.5. πa^2
 12.3.6. $41\pi/2$
 12.3.7. $2 - \pi/2$
 12.3.8. $\pi/12$
 12.3.9. $3\pi/16$
 12.3.10. $\pi/4 - 3\sqrt{3}/8$
 12.3.11. $\pi/2 + 3\sqrt{3}/8$
 12.3.12. $1/2$
 12.3.13. $3/2 - \pi/4$
 12.3.14. $\pi/3 + \sqrt{3}/2$
 12.3.15. $\pi/3 - \sqrt{3}/4$
 12.3.16. $4\pi^3/3$
 12.3.17. π^2
 12.3.18. $5\pi/24 - \sqrt{3}/4$
 12.3.19. $7\pi/12 - \sqrt{3}$
 12.3.20. $4\pi - \sqrt{15}/2 - 7 \arccos(1/4)$
 12.3.21. $3\pi^3$
- 12.4.6. $x = t - \frac{\sin(t)}{2}$, $y = 1 - \frac{\cos(t)}{2}$
- 12.4.7. $x = 4 \cos t - \cos(4t)$,
 $y = 4 \sin t - \sin(4t)$
- 12.4.8. $x = 2 \cos t + \cos(2t)$,
 $y = 2 \sin t - \sin(2t)$
- 12.4.9. $x = \cos t + t \sin t$,
 $y = \sin t - t \cos t$
- 12.5.1. There is a horizontal tangent at all multiples of π .

- 12.5.2. $9\pi/4$
 12.5.3. $\int_0^{2\pi} \frac{1}{2} \sqrt{5 - 4 \cos t} dt$
 12.5.4. Four points:
 $\left(\frac{-3 - 3\sqrt{5}}{4}, \pm \sqrt{\frac{5 - \sqrt{5}}{8}}\right)$,
 $\left(\frac{-3 + 3\sqrt{5}}{4}, \pm \sqrt{\frac{5 + \sqrt{5}}{8}}\right)$
- 12.5.5. $11\pi/3$
 12.5.6. $32/3$
 12.5.7. 2π
 12.5.8. $16/3$
 12.5.9. $(\pi/2, 1)$
 12.5.10. $5\pi^3/6$
 12.5.11. $2\pi^2$
 12.5.12. $(2\pi\sqrt{4\pi^2 + 1} + \ln(2\pi + \sqrt{4\pi^2 + 1}))/2$
- 13.1.1. 1
 13.1.3. 0
 13.1.4. 1
 13.1.5. 1
 13.1.6. 0
- 13.2.1. $\lim_{n \rightarrow \infty} n^2/(2n^2 + 1) = 1/2$
 13.2.2. $\lim_{n \rightarrow \infty} 5/(2^{1/n} + 14) = 1/3$
- 13.2.3. $\sum_{n=1}^{\infty} \frac{1}{n}$ diverges, so $\sum_{n=1}^{\infty} 3 \frac{1}{n}$ diverges
- 13.2.4. $-3/2$
 13.2.5. 11
 13.2.6. 20
 13.2.7. $3/4$
- 13.2.8. $3/2$
 13.2.9. $3/10$
 13.3.1. diverges
 13.3.2. diverges
 13.3.3. converges
 13.3.4. converges
 13.3.5. converges
 13.3.6. converges
 13.3.7. diverges
 13.3.8. converges
 13.3.9. $N = 5$
 13.3.10. $N = 10$
 13.3.11. $N = 1687$
 13.3.12. any integer greater than e^{200}
- 13.4.1. converges
 13.4.2. converges
 13.4.3. diverges
 13.4.4. converges
 13.4.5. 0.90
 13.4.6. 0.95
- 13.5.1. converges
 13.5.2. converges
 13.5.3. converges
 13.5.4. diverges
 13.5.5. diverges
 13.5.6. diverges
 13.5.7. converges
 13.5.8. diverges
 13.5.9. converges
 13.5.10. diverges
- 13.6.1. converges absolutely
 13.6.2. diverges

- 13.6.3. converges conditionally
 13.6.4. converges absolutely
 13.6.5. converges conditionally
 13.6.6. converges absolutely
 13.6.7. diverges
 13.6.8. converges conditionally
 13.7.5. converges
 13.7.6. converges
 13.7.7. converges
 13.7.8. diverges
- 13.8.1. $R = 1$, $I = (-1, 1)$
 13.8.2. $R = \infty$, $I = (-\infty, \infty)$
 13.8.3. $R = e$, $I = (-e, e)$
 13.8.4. $R = e$, $I = (2 - e, 2 + e)$
 13.8.5. $R = 0$, converges only when $x = 2$
 13.8.6. $R = 1$, $I = [-6, -4]$
- 13.9.1. the alternating harmonic series
 13.9.2. $\sum_{n=0}^{\infty} (n+1)x^n$
 13.9.3. $\sum_{n=0}^{\infty} (n+1)(n+2)x^n$
 13.9.4. $\sum_{n=0}^{\infty} \frac{(n+1)(n+2)}{2} x^n$, $R = 1$
 13.9.5. $C + \sum_{n=0}^{\infty} \frac{-1}{(n+1)(n+2)} x^{n+2}$
- 13.10.1. $\sum_{n=0}^{\infty} (-1)^n x^{2n}/(2n)!$, $R = \infty$
 13.10.2. $\sum_{n=0}^{\infty} x^n/n!$, $R = \infty$
 13.10.3. $\sum_{n=0}^{\infty} (-1)^n \frac{(x-5)^n}{5^{n+1}}$, $R = 5$

- 13.10.4. $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{(x-1)^n}{n}$, $R = 1$
 13.10.5. $\ln(2) + \sum_{n=1}^{\infty} (-1)^{n-1} \frac{(x-2)^n}{n2^n}$, $R = 2$
 13.10.6. $\sum_{n=0}^{\infty} (-1)^n (n+1)(x-1)^n$, $R = 1$
 13.10.7. $1 + \sum_{n=1}^{\infty} \frac{1 \cdot 3 \cdot 5 \cdots (2n-1)}{n!2^n} x^n = 1 + \sum_{n=1}^{\infty} \frac{(2n-1)!}{2^{2n-1}(n-1)!n!} x^n$, $R = 1$
- 13.10.8. $x + x^3/3$
 13.10.9. $\sum_{n=0}^{\infty} (-1)^n x^{4n+1}/(2n)!$
 13.10.10. $\sum_{n=0}^{\infty} (-1)^n x^{n+1}/n!$
- 13.11.1. $1 - \frac{x^2}{2} + \frac{x^4}{24} - \frac{x^6}{720} + \cdots + \frac{x^{12}}{12!}$
 13.11.2. 1000; 8
 13.11.3. $x + \frac{x^3}{3} + \frac{2x^5}{15}$, error ± 1.27 .
- 13.12.1. diverges
 13.12.2. converges
 13.12.3. converges
 13.12.4. diverges
 13.12.5. diverges
 13.12.6. diverges
 13.12.7. converges
 13.12.8. converges
 13.12.9. converges
 13.12.10. converges
 13.12.11. converges
 13.12.12. converges
 13.12.13. converges

- 13.12.14. converges
 13.12.15. converges
 13.12.16. converges
 13.12.17. diverges
 13.12.18. $(-\infty, \infty)$
 13.12.19. $(-3, 3)$
 13.12.20. $(-3, 3)$
 13.12.21. $(-1, 1)$
 13.12.22. radius is 0—it converges only when $x = 0$
 13.12.23. $(-\sqrt{3}, \sqrt{3})$
 13.12.24. $(-\infty, \infty)$
 13.12.25. $\sum_{n=0}^{\infty} \frac{(\ln(2))^n}{n!} x^n$
- 13.12.26. $\sum_{n=0}^{\infty} \frac{(-1)^n}{n+1} x^{n+1}$
 13.12.27. $\sum_{n=0}^{\infty} \frac{2}{2n+1} x^{2n+1}$
 13.12.28. $1 + x/2 + \sum_{n=2}^{\infty} (-1)^{n+1} \frac{1 \cdot 3 \cdot 5 \cdots (2n-3)}{2^n n!} x^n$
 13.12.29. $\sum_{n=0}^{\infty} (-1)^n x^{2n}$
 13.12.30. $\sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1} x^{2n+1}$
 13.12.31. $\pi = \sum_{n=0}^{\infty} (-1)^n \frac{4}{2n+1}$