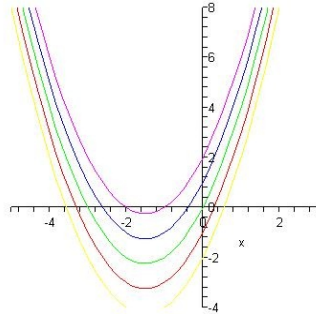


**Exercise Set 3.1**

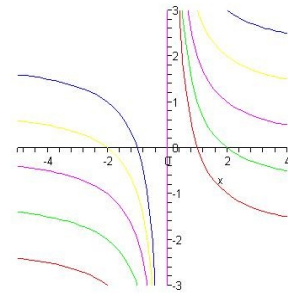
1.  $3x + c$  2.  $x^4/4 + c$  3.  $\frac{-1}{2x^2} + c$  4.  $\frac{2}{3}x^{3/2} + c$  5.  $\frac{2}{3}t^{3/2} + c$  6.  $\frac{3}{4}x^{4/3} + c$  7.  $\frac{4}{5}t^{5/4} + c$  8.  $2\sqrt{x} + c$   
 9.  $\frac{4}{7}x^{7/4} + c$  10.  $\frac{7}{2}w^{2/7} + c$  11.  $\frac{2}{5}s^{5/2} + c$  12.  $\frac{4}{9}x^{9/4} + c$  13.  $3x^{1/3} + c$  14.  $\frac{t^8}{4} + c$  15.  $-\frac{1}{4w^2} + c$   
 16.  $\frac{r^4}{2} + \frac{3}{r} + 4r + c$  17.  $\frac{5}{3}x^3 + \frac{4}{3}x^{3/2} - 3x + c$  18.  $\frac{27x^4}{4} + c$  19.  $\frac{4x^3}{3} + 2x^2 + x + c$  20.  $\frac{t^5}{5} + \frac{2t^3}{3} + t + c$   
 21.  $\frac{2\sqrt{2}}{3}x^{3/2} + c$  22.  $\frac{-4}{x} + \frac{7}{3x^3} - \frac{1}{2x^4} + c$  23.  $\frac{2t^7 - 2t^4 - 3}{4t^2} + c$  24.  $4 \ln|x| + c$  25.  $2 \ln|x| + c$  26.  $7e^x + c$   
 27.  $2e^t + c$  28.  $5 \ln|x| - 2e^x + 7x + c$  29.  $2e^t - \frac{3t^5}{5} + 7 \ln|t| - 12t + c$  30.  $x^4 - 9e^x + 8 \ln|x| - 5x + c$   
 32. (a)  $\frac{1}{2}e^x + c$  (b)  $-e^{-x} + c$  (c)  $-\frac{1}{4}e^{-4x} + c$  33. (a)  $\ln x$  (b)  $\ln x$  34.  $\frac{1}{a+bx}$  35. They differ by a constant

**Exercise Set 3.2**

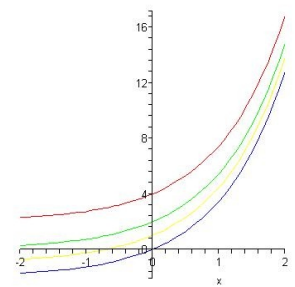
1.  $x^2 - 3x + 7$  2.  $\frac{x^3}{3} - x^2 + 9x + 2$  3.  $2e^x - 4x^{3/2} + 2x + 2$  4.  $3e^x + \frac{2}{x} + x + 4 - 3e^2$  5.  $2x + 5 \ln|x| + 1$   
 6.  $3x - 2 \ln|x| + \frac{x^3}{3} + \frac{5}{3}$  7.  $x^2 + 2$  8.  $\frac{x^3}{6} - x^2 + 3x + \frac{19}{6}$  9.  $-2 \ln|x| - \frac{1}{6x^2} + \frac{14}{3}x - \frac{199}{24} - 2 \ln 2$   
 10.  $3e^x + x^2 - 6x - 2$  11.



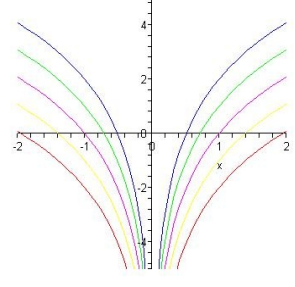
12.



13.



14.



15. 96 ft/sec

16. (a) 282.84 ft/sec  
 (b) 282.84 ft/sec  
 (c) gravity acts the same way in both cases.

17. (a) 3.953 sec (b) 1.768 sec 18. (a) 78.33 (b) 143.53 19. (a) 68.26 (b) 74.76 20.  $x^2 + 50x + 5000$   
 21. (a)  $-2x^2 + 8x$  (b)  $-2x + 8$  22.  $P(x) = -0.05x^2 + 830x - 800$  23.  $y = -\frac{1}{x^3 + c}$  24.  $y = \sqrt[5]{\frac{5x^4}{2} + c}$   
 25.  $y = \sqrt[3]{\frac{-5}{9x^5 + c}}$  26.  $y^2 = 8e^x + c$  27.  $6x^3y^2 + 18x^3 \ln|y| = -3x - 4 + cx^3$  28.  $x^3y^3 - 16x^3 = 2x^3y \ln|x| - 2y + cx^3y$

29. If  $n = 1$ ,  $y = ce^{kx}$  otherwise,  $y^{1-n} = k(1-n)x + c$  30.  $M = 1, N \neq -1$   $y = ce^{\frac{ax^{N+1}}{N+1}}$ ;  $M = 1, N = -1$   $y = ce^{abx}$   
 $M \neq 1, N = -1$   $y^{1-M} = a(1-M)\ln|x| + c$ ;  $M \neq 1, N \neq -1$ ,  $y^{1-M} = \frac{1-M}{1+N} ax^{N+1} + c$  33.  $y = \frac{4}{3}x^{3/2} - \frac{2}{3}$   
 34.  $y = x^3 - \frac{7}{2}x^2 + 5x$  35.  $2y^2 = -x^2 + c_2$  36. (a)  $-\sqrt{2gs(0)}$  (b)  $v = \frac{g(1-e^{-kt})}{k}$  37. If it has constant velocity,  
 its acceleration will be zero

### Exercise Set 3.3

1.  $\frac{(2x^3+3)^2}{2} + c$  2.  $\frac{2}{3}(4x+1)^{3/2} = c$  3.  $\frac{(3x^5+1)^9}{9} + c$  4.  $\frac{(2x+1)^{10}}{10} + c$  5.  $e^{2x^2} + c$  6.  $\ln|2x+1| + c$   
 7.  $\frac{1}{36}(3x^2+2)^6 + c$  8.  $\frac{(3x^6-2)^{10}}{180} + c$  9.  $\frac{1}{3}(2x+1)^{3/2} + c$  10.  $\frac{1}{6}(4x^3+7)^{3/2} + c$  11.  $-\sqrt{1-x^4} + c$   
 12.  $\frac{1}{3}e^{-\frac{3}{x}} + c$  13.  $\frac{-1}{8(3x^2+4x+1)^4} + c$  14.  $\frac{1}{2}\ln|3x^2+4x+1| + c$  15.  $\frac{1}{2}\ln|4x^5-2x^3+3x^2+8x+5| + c$   
 16.  $\frac{1}{4}(2+3x^{2/3})^2 + c$  17.  $\frac{1}{12}e^{4x^3} + c$  18.  $\frac{2}{3}e^{3x^5+7} + c$  19.  $\frac{1}{4}e^{4x^3+2x^2+1} + c$  20.  $\frac{1}{9}(1+3e^{2x})^{3/2} + c$   
 21.  $\frac{1}{2}\ln(x^2+1) + c$  22.  $\frac{\ln(5^{3x}+2)}{3\ln 5} + c$  23.  $-\frac{1}{4(e^{2x}+1)^2} + c$  24.  $\frac{1}{2}\ln(e^{2x}+1) + c$  25.  $-\frac{1}{8}\left(3+\frac{2}{x}\right)^4 + c$   
 26.  $4x - \frac{1}{2}\ln(x^2+1) + c$  27.  $\frac{x^2}{2} - x + \ln|x+1| + c$  28.  $\frac{1}{a}\ln|ax+b| + c$  29.  $\frac{1}{a}e^{ax} + c$  30.  $\frac{(\ln x)^4}{4} + c$  31.  $\frac{4^{2x}}{2\ln 4} + c$   
 32.  $\frac{5^{4x^2}}{4\ln 5} + c$  33.  $\ln|\ln|x|| + c$  34.  $\frac{(\ln x)^{N+1}}{N+1} + c$  when  $N \neq -1$  35. (a)  $\frac{4}{3}x^3 + 6x^2 + 9x + c$  (b)  $\frac{1}{6}(2x+3)^3 + C$   
 (c) They differ by a constant. 36.  $\frac{625}{17}x^{17} + \frac{250}{7}x^{14} + \frac{150}{11}x^{11} + \frac{5}{2}x^8 + \frac{x^5}{5} + c$  37. If  $n = m - 1$  and  $am \neq 0$   
 38. (a)  $-\ln(1+e^{-x}) + c_1$  (b)  $x - \ln(e^x+1) + c_2$  (c) they are the same

### Exercise Set 3.4

1. (a) 0.5 (b) 0.2 (c) 0.02 2. (a) 0.75 (b) 0.3 (c) 0.03 3.  $\{0, 0.5, 1, 1.5, 2\}$  4.  $\{3, 3.5, 4, 4.5, 5\}$   
 5. 5.75 6. 7.75 7. 6.625 8. 10 9. 10 10. 11 11. (a) 3.125 (b) 3.875 (c) 3.5 12. (a) 2.25 (b) 1.75 (c) 2  
 13. (a) 19.21875 (b) 21.46875 (c) 20.328125 14. (a) 13.953125 (b) 18.703125 (c) 16.210938 15. 10.75  
 16. (a) 3.3125 (b) 3.6875 (c) 3.5 17. (a) 2.125 (b) 1.875 (c) 2 18. 19.773438 (b) 20.898438 (c) 20.332031  
 19. 10.6875 20. (a) 3.40625 (b) 3.59375 (c) 3.5 21. (a) 2.0625 (b) 1.9375 (c) 2 22. (a) 20.052734  
 (b) 20.615234 (c) 20.333008 23. (a) 0.32779589 (b) 0.31579589 (c) 0.32172789 24. (a) 20.288350  
 (b) 20.37835 (c) 20.333325 25. (a) 0.0833 (b) 0.0833 (c) 0.08335 26. (a) 6.3253785 (b) 6.4531596  
 (c) 6.3889496 27. (a) 2.5243268 (b) 2.5659156 (c) 2.5452056 28. 10 29. 3.5 30. 2 31. 20.34375

### Exercise 3.5

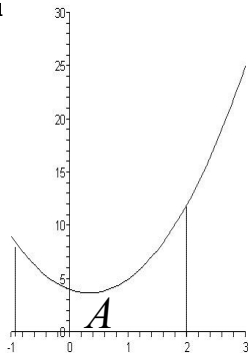
1.  $\sum_{i=1}^{20} \frac{1}{i}$  2.  $\sum_{i=2}^{23} (2i+1)$  3.  $\sum_{i=1}^{19} \frac{1}{2i}$  4.  $\sum_{i=1}^5 (5i-4)$  5.  $\sum_{i=2}^6 \frac{i-1}{2i+1}$  or  $\sum_{i=1}^5 \frac{i}{2i+3}$  6.  $\sum_{i=1}^{12} 2^{i-1}$  7.  $\sum_{i=1}^n ar^{i-1}$   
 8.  $\sum_{i=1}^n \frac{x^i}{i}$  9. 105 10. 32 11. 3457/840 12. 8 13. 240 14. 228 15. 8270 16. 850,745 17. 791,910  
 18. 292,320 19. (a) 62 (b) 2,097,150 (c)  $2^{n+1} - 2$  20.  $a_{n+1} - a_1$  21.  $a_{n+1} - a_1 + a_n - a_0$  22. (a) 50  
 (b) 500 (c)  $\frac{n+1}{2}$  23. 81,159,640 24. -358,192,305,872 25. -19,961,022 26. 1 27. 1 28. 20/3 29.  
 75/4 30. Region bounded by  $y = 3x^2$ ,  $y = 0$ ,  $x = 0$  and  $x = 1$  31. Region bounded by  $y = 4x^3$ ,  $y = 0$ ,  $x = 0$   
 and  $x = 1$  32. Region bounded by  $y = 6 + 2x^2$ ,  $y = 0$ ,  $x = 0$  and  $x = 1$  33. Region bounded by  $y = 5x^3$ ,  
 $y = 0$ ,  $x = 1$  and  $x = 2$  34. 8 35. 2/3 36. 1/4 37. (a) 11/2 (b) 5/6 (c) 10/3 38. 14/3 39. (a) 15/4

- (b)  $1/4$  (c)  $1/2$  (d)  $17/4$  40.  $\lim_{n \rightarrow \infty} \sum_{i=1}^n e^{i/n} \frac{1}{n}$  41.  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \ln(1 + \frac{i}{n}) \frac{1}{n}$  44. (a)  $\left(\frac{n(n+1)}{2}\right)^2$   
 (b)  $\frac{n(n+1)(6n^3+9n^2+n-1)}{30}$  (c)  $\frac{n^2(n+1)^2(2n^2+2n-1)}{12}$  47. Consider the interval  $[0, 1]$ , with the  
 partition  $\{0, 1/10, 1/10+9/(10n), 1/10+2 \cdot 9/(10n), 1/10+3 \cdot 9/(10n), \dots, 1\}$  48. (a)  $2/3$  (b)  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left(\frac{i}{n}\right)^{1/2} \frac{1}{n}$   
 49. (a)  $3/4$  (b)  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left(\frac{i}{n}\right)^{1/3} \frac{1}{n}$

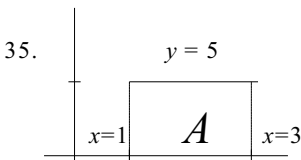
### Exercise Set 3.6

1. 10 2. 20 3.  $k(b-a)$  4. (a)  $15/2$  (b)  $-15/2$  5. (a) 6 (b) -6 6. -2 7.  $38/3$  8.  $195/4$  9. 18 10.  $11/2$   
 11.  $8/3$  12.  $1793/12$  13. 3 14.  $11/5$  15.  $14/3$  16.  $7/9$  17. (a)  $\ln 2$  (b)  $\ln 2$  (c)  $\ln 2$  18. (a)  $\ln |b/a|$   
 (b)  $\ln |b/a|$  19.  $1/2(\ln 5 - \ln 2)$  20.  $e-1$  21.  $\frac{e^{-2}-e^{-4}}{2}$  22.  $2(e^2 - e)$  23.  $13/2$  24.  $13/3$  25. (a)  $\int_1^2 (4x+1) dx$   
 (b) 7 26. (a)  $\int_2^3 (x^2+1) dx$  (b)  $22/3$  27. (a)  $\int_{-2}^2 (4-x^2) dx$  (b)  $32/2$  28. (a)  $\int_1^2 \frac{4}{x^{1/2}} dx$  (b)  $8(\sqrt{2}-1)$   
 29. (a)  $\int_1^3 \frac{4}{x} dx$  (b)  $4 \ln 3$  30. (a)  $\int_1^2 e^{-x} dx$  (b)  $e^{-1} - e^{-2}$  31.  $81/2$  32.  $\int_1^2 x^2 dx = 7/3$  33.  $\int_2^3 e^x dx = e^3 - e^2$

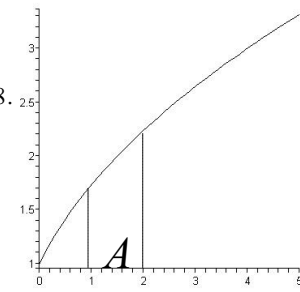
34.  $\int_1^5 (2x^3 - 3x^2 + 1) dx = 192$



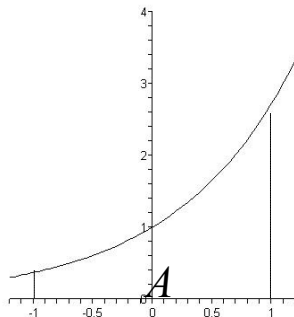
37.



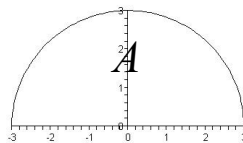
38.



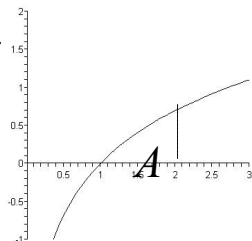
39.



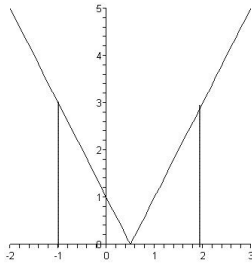
40.



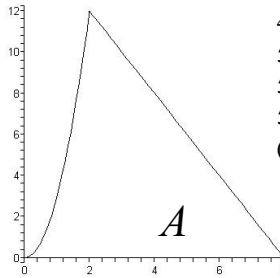
41.



42.



43.



44. 63/2 45. 9 46. 18 47. 9  
 48. 2 ln 3 49. 2 ln 3  
 50. 3 ln 2 + 4 51. 3(e<sup>2</sup> - 1)  
 52. 2(e<sup>2</sup> - e<sup>-2</sup>) 53. 8 54. 28/3  
 57. (a) 3/16 < A < 1  
 (b) 0.24535037 (c) 0.254353

58. (a)  $\frac{\ln 2}{\sqrt{2}} < A < 1$  (b) 0.56226116 (c) 0.562262 60. ±0.466221 61. 0.486047 or -1.72775

65. 0.32175054 (using  $n = 100$ )

**Exercise Set 3.7**

1. 1/5 2. 38/15 3. 1 4. 0 5. -2 ln 3 6. 1/2 ln 5/2 7. 0 8.  $\frac{e^2 - e^{-2}}{6}$  9.  $\frac{(\ln 2)^2}{2}$  10.  $\frac{1}{2} \ln(e^2 + 1)$  11. 0  
 12. 0 13. 6 14. 0 15. 0 16. 9 17. 0 18. 9/2 19. 956/15 20. 26/5 21. 16/3 22. 1 - e<sup>-1</sup> 23. ln 10  
 24. ln 5 25. 1/2 ln 17 26. (a) 0 (b) 0 27. (a)  $\frac{m(a+b)+2d}{2}$  (b) 1/2(a + b) 28. (a) 1/3 (b)  $\frac{1}{\sqrt{3}}$  29. (a) 1/2 ln 5/2  
 (b) 1.52846 30. (a)  $\frac{1 - e^{-4}}{4}$  (b) 0.262997 or 1.287403 31. \$6082.69 32. \$1107.01

33. x<sup>2</sup> 34.  $\sqrt{1-x^2}$  35.  $x^4 \sqrt[3]{1-x^2}$  36.  $\frac{3}{2}x^5$  37.  $\frac{\left( (1+x^2)\sqrt{4-x^2} - 2x \int_0^x \sqrt{4-t^2} dt \right)}{(1+x^2)^2}$  39. ±0.674537  
 42.  $f(v(x))v'(x) - f(u(x))u'(x)$  43.  $2x\sqrt{x^4+1}$  44.  $\frac{3x^5}{x^6+1} - \frac{2e^{4x}}{e^{4x}+1}$

**Exercise Set 3.8**

1. 9 2. 32 3. 32/3 4. 9 5. 9 6. 1331/750 7. 8 8. 32 9. 37/6 10. 1 11. 6 12. 9/2 13. 9 14. 27/2  
 15. 25.1771 16. (a) 10,000 (b) 2500 17. (a) 1260 (b) 180 18. (a) 11/3 (b) 7 19. (a) 17/3 (b) 6.59 20.  
 (A) 16.75 (b) 21.02 21. (a) \$63,138.58 (b) \$77,892.69 22. (a) \$93,174.11 (b) \$309,348.92  
 23. (a) \$12,969.09 (b) \$23,613.00 24. (a) \$152,996.22 (b) \$278,777.29 25. \$688,338.79 26. (b) 1/2  
 27. (b) 5/32 (c) 11/32 (d) 11/16 (e) 27/32 (f) 1/2 28. (b) 0.731059 (c) 0.268941 (d) 0.731059  
 29. (a) 1/2 (b) 19/32 30. 1.17157 31. 0 32. 0.28311 33. 0 37.  $A = T \left[ \frac{e^{r-1}}{r} \right]$  38.  $T_0 \left[ \frac{e^{(j-r)t} - 1}{j-r} \right]$

40.  $\int_a^{x_e} D(x) dx - (x_e - a)p_e$  41.  $(x_e - a)p_e - \int_a^{x_e} S(x) dx$

**Exercise Set 3.9**

1.  $\frac{2}{15}(x+1)^{3/2}(3x-2) + c$  2.  $2\sqrt{x-1}(x+4) + c$  3. 1209/14 4.  $\frac{1}{105}(2x-1)^{3/2}(15x^2+6x+2)$

5. -40224/1105      6.  $\frac{3}{4}(2x-1)e^{2x}+c$       7.  $\frac{2(1-4e^{-3})}{9}$       8.  $-\frac{1}{4}(2x^2+2x+1)e^{-2x}+c$   
 9.  $\frac{1}{128}(32x^3-24x^2+12x-3)e^{4x}+c$       10.  $-\frac{1}{4}(2x^4+4x^3+6x^2+6x+3)e^{-2x}+c$       11.  $2 \ln 2 - 3/4$   
 12.  $\frac{1}{2}(2x+3)\ln(2x+3)-x+c$       13.  $\frac{x^2}{2}(\ln x)^2-x\ln x+\frac{1}{2}+c$       14.  $\frac{e^2-5e^{-2}}{4}$   
 15.  $\begin{cases} \frac{(\ln x)^2}{2}+c & \text{if } n=-1 \\ \frac{x^{n+1}}{n+1}\left(\ln x-\frac{1}{n+1}\right)+c & \text{if } n \neq -1 \end{cases}$       16.  $\frac{e^2-5e^{-2}}{4}$       17.  $2 \ln 2 - 3/4$       18. (b) 0.424367 (c) 0.575633  
 19. (b) 0.353093 (c) 0.381282      20. 1.11537      21. 16/7

### Chapter Review

1.  $\frac{9n^4+10n^3+21n^2-64n}{12}$       2. (a) 13/2 (b)  $\int_0^1 (2x^3+4x^2+7x-1) dx$       3.  $4^{16}-1$       4. (a) 204 (b) 452 (c) 310  
 5. (a) 311.0592 (b) 320,9792 (c) 315.9904 exact area is 316      6. 15      7. (a) 196 ft (b) -112 ft/sec  
 8.  $p=\sqrt{9-x}$       9.  $y=\frac{1}{\sqrt{1-\ln(1+x^2)}}$       10.  $\frac{1}{40}(1+4t^2)^{3/2}(6t^2-1)+c$       11.  $\frac{3}{4}(9^3\sqrt{9}-16)$       12.  $\frac{1}{10}\ln(4-2e^{-5x})+c$   
 13.  $\frac{1}{3}(\ln 2)^3$       14.  $\frac{(\ln 3)^2-(\ln 2)^2}{2(\ln 3)^2(\ln 2)^2}$       15.  $\frac{45-327e^{-2}}{8}$       16. (a) 0.0202 (b) 0.021549      17. 93/5      18. 32/315  
 19. (a) 0.08758058 (b) 4/3      20. (a)  $\frac{7}{48}\sqrt{14}$  (b) 0.836667 (c) 0.83      21. (a) \$329,226.55 (b) \$1,269,966.90  
 22. (a) \$1,964,322.07 (b) \$6,521,778.93      23.  $x\sqrt{1-x^2}$       24.  $2x^3\sqrt{1-x^4}$