13. Use $y = \sqrt[3]{x}$; $dy = 1/(3\sqrt[3]{x^2}) \cdot dx$ with $x = 8$ and $dx = 0.5$. Thus $dy = 1/24 \approx 1/25 = 0.04$; knowing $\sqrt[3]{8} = 2$, we have $\sqrt[3]{8.5} \approx 2.04$.

15. Use $y = \cos x$; $dy = -\sin x \cdot dx$ with $x = \pi/2 \approx 1.57$ and $dx \approx -0.07$. Thus $dy = 0.07$; knowing $\cos \pi/2 = 0$, we have $\cos 1.5 \approx 0.07$.

17. $dy = (2x + 3)dx$

19. $dy = \frac{-2}{4x^3}dx$

21. $dy = \left(2xe^{3x} + 3x^2e^{3x}\right)dx$

23. $dy = \frac{2(\tan x+1)-2x\sec^2 x}{(\tan x+1)^2}dx$

25. $dy = (e^x \sin x + e^x \cos x)dx$

27. $dy = \frac{1}{(x+2)^2}dx$

29. $dy = (\ln x)dx$

31. (a) ± 12.8 feet
    (b) ± 32 feet

33. $\pm 48 \text{in}^2$, or $1/3\text{ft}^2$

35. (a) 298.8 feet
    (b) ± 17.3 ft
    (c) $\pm 5.8\%$

37. The isosceles triangle setup works the best with the smallest percent error.

Section 4.5

1. F

3. $x_0 = 1.5$, $x_1 = 1.5709148$, $x_2 = 1.5707963$, $x_3 = 1.5707963$, $x_4 = 1.5707963$, $x_5 = 1.5707963$

5. $x_0 = 0$, $x_1 = 2$, $x_2 = 1.2$, $x_3 = 1.0117647$, $x_4 = 1.0000458$, $x_5 = 1$

7. $x_0 = 2$, $x_1 = 0.6137056389$, $x_2 = 0.9133412072$, $x_3 = 0.9961317034$, $x_4 = 0.9999925085$, $x_5 = 1$

9. roots are: $x = -3.714$, $x = -0.857$, $x = 1$ and $x = 1.571$

11. roots are: $x = -2.165$, $x = 0$, $x = 0.525$ and $x = 1.813$

13. $x = -0.637$, $x = 1.410$

15. $x = \pm 4.493$, $x = 0$

17. The approximations alternate between $x = 1$, $x = 2$ and $x = 3$.

Chapter 5

Section 5.1

1. Answers will vary.

3. Answers will vary.

5. Answers will vary.

7. velocity

9. $1/9x^9 + C$

11. $t + C$

13. $-1/(3t) + C$

15. $2\sqrt{x} + C$

17. $-\cos\theta + C$

19. $5e^{\theta} + C$

21. $\frac{5^t}{2\ln 5} + C$

23. $t^6/6 + t^4/4 - 3t^2 + C$

25. $e^{\pi}x + C$

27. $\frac{x^2}{2} + 3x + \ln|x| + C$

29. (a) $x > 0$
    (b) $1/x$
    (c) $x < 0$
    (d) $1/x$
    (e) $\ln|x| + C$. Explanations will vary.

31. $-\cos x + 3$

33. $x^4 - x^3 + 7$

35. $\tan x + 4$

37. $4\tan^{-1} x + \pi + 12$

39. $\frac{7x^3}{6} - \frac{9x}{2} + \frac{40}{3}$

41. $\theta - \sin(\theta) - \pi + 4$

43. $3x - 2$

45. $dy = (2xe^x \cos x + x^2e^x \cos x - x^2e^x \sin x)dx$

Section 5.2

1. Answers will vary.

3. 0

5. (a) 3
   (b) 4
   (c) 3
   (d) 0
   (e) -4
   (f) 9

7. (a) 4
   (b) 2
   (c) 4
   (d) 2
   (e) 1
   (f) 2

9. (a) π
   (b) π
   (c) 2π
   (d) 10π

11. (a) $4/\pi$
    (b) $-4/\pi$
    (c) 0
    (d) $2/\pi$

13. (a) $40/3$
    (b) $26/3$
    (c) $8/3$
    (d) $38/3$

15. (a) 3ft/s
    (b) 9.5ft
    (c) 9.5ft

17. (a) 96ft/s
    (b) 6 seconds
    (c) 6 seconds
    (d) Never; the maximum height is 208ft.

19. 5
21. Answers can vary; one solution is $a = -2$, $b = 7$
23. -7
25. Answers can vary; one solution is $a = -11$, $b = 18$
27. $-\cos x - \sin x + \tan x + C$
29. $\ln|x| + \csc x + C$

Section 5.3

1. limits
3. Rectangles.
5. $2^2 + 3^2 + 4^2 = 29$
7. $0 - 1 + 0 + 1 + 0 = 0$
9. $-1 + 2 - 3 + 4 - 5 + 6 = 3$
11. $1 + 1 + 1 + 1 + 1 + 1 = 6$
13. Answers may vary; $\sum_{i=0}^{8}(i^2 - 1)$
15. Answers may vary; $\sum_{i=0}^{4}(-1)^i e^i$
17. 1045
19. -8525
21. 5050
23. 155
25. 24
27. 19
29. $\pi/3 + \pi/(2\sqrt{3}) \approx 1.954$
31. 0.388584
33. (a) Exact expressions will vary; $\frac{(1+n)^2}{4n^2}$.
    (b) 121/400, 10201/40000, 1002001/4000000
    (c) 1/4
35. (a) 8.
    (b) 8, 8, 8
    (c) 8
37. (a) Exact expressions will vary; $100 - 200/n$.
    (b) 80, 98, 499/5
    (c) 100
39. $F(x) = 5\tan x + 4$
41. $G(t) = 4/6t^6 - 5/4t^4 + 8t + 9$
43. $G(t) = \sin t - \cos t - 78$

Section 5.4

1. Answers will vary.
3. T
5. 20
7. 0
9. 1
11. $(5 - 1/5)/\ln 5$
13. -4
15. 16/3
17. 45/4
19. 1/2
21. 1/2
23. 1/4
25. 8
27. 0
29. Explanations will vary. A sketch will help.
31. $c = \pm 2/\sqrt{3}$
33. $c = 64/9 \approx 7.1$
35. 2/*pi*
37. 16/3
39. $\pi/4$
41. -300ft
43. $1.5/\ln(2) \approx 2.164$miles
45. 128/5ft
47. 50ft/s
49. 0ft/s
51. 21
53. 343/6
55. $F'(x) = 3x^{11}$
57. $F'(x) = e^x \sin(e^x) - \dfrac{1}{x}\sin(\ln x)$
59. $F'(x) = \ln(1 - e^x) + \dfrac{\ln x}{1 - x}$

Section 5.5

1. Chain Rule.
3. $\frac{1}{8}(x^3 - 5)^8 + C$
5. $\frac{1}{18}\left(x^2 + 1\right)^9 + C$
7. $\frac{1}{2}\ln|2x + 7| + C$
9. $\frac{2}{3}(x+3)^{3/2} - 6(x+3)^{1/2} + C = \frac{2}{3}(x-6)\sqrt{x+3} + C$
11. $2e^{\sqrt{x}} + C$
13. $-\frac{1}{2x^2} - \frac{1}{x} + C$
15. $\frac{1}{3}(2x+1)^{3/2} - \sqrt{2x+1} + C$
17. $-\frac{1}{6}\sin(3 - 6x) + C$
19. $\frac{1}{2}\ln|\sec(2x) + \tan(2x)| + C$
21. $\frac{\sin\left(x^2\right)}{2} + C$
23. The key is to multiply $\csc x$ by 1 in the form $(\csc x + \cot x)/(\csc x + \cot x)$.
25. $\sin(e^x) + C$
27. $\frac{1}{3}e^{3x-1} + C$
29. $\frac{1}{2}e^{(x-1)^2} + C$
31. $\frac{e^{-3x}}{3} - e^{-x} + C$
33. $\frac{16^x}{\ln(16)} + C$
35. $\frac{\left(\ln x\right)^3}{3} + C$
37. $\frac{1}{2}\ln\left(\ln\left(x^2\right)\right) + C$
39. $\frac{1}{2}\left(x^2 + 10x + 20\ln|x - 3|\right) + C$
41. $\frac{1}{3}\ln\left|x^2 + 3x + 3\right| + \frac{\ln|x|}{3} + C$
43. $3\sin^{-1}\left(\frac{x}{3}\right) + C$

45. $\frac{2}{3}\sec^{-1}(|x|/3)+C$

47. $\frac{1}{2}\sin^{-1}\left(x^2\right)+C$

49. $2\sin^{-1}\left(\frac{x-3}{4}\right)+C$

51. $\frac{1}{2}\tan^{-1}\left(x^2\right)$+C

53. $-\frac{1}{3\left(x^3+3\right)}+C$

55. $-\sqrt{1-x^2}+C$

57. $-\frac{2}{3}\cos^{\frac{3}{2}}(x)+C$

59. $\frac{7}{3}\ln|3x+2|+C$

61. $\ln\left|x^2+7x+3\right|+C$

63. $-\frac{x^2}{2}+2\ln\left|x^2-7x+1\right|+7x+C$

65. $\tan^{-1}(2x)+C$

67. $\frac{1}{3}\sin^{-1}\left(\frac{3x}{4}\right)+C$

69. $\frac{3}{2}\ln\left|x^2-2x+10\right|+\frac{1}{3}\tan^{-1}\left(\frac{x-1}{3}\right)+C$

71. $\frac{15}{2}\ln\left|x^2-10x+32\right|+x+\frac{41\tan^{-1}\left(\frac{x-5}{\sqrt{7}}\right)}{\sqrt{7}}+C$

73. $\frac{x^2}{2}+3\ln\left|x^2+4x+9\right|-4x+\frac{24\tan^{-1}\left(\frac{x+2}{\sqrt{5}}\right)}{\sqrt{5}}+C$

75. $\tan^{-1}(\sin(x))+C$

77. $3\sqrt{x^2-2x-6}+C$

79. $-\ln 2$

81. $2/3$

83. $(1-e)/2$

85. $\pi/2$

87. $e^{\pi/3}-1$

89. 1

91. 2

93. $-\frac{1}{2}\cos(2x+\pi)+\frac{91}{2}$

95. $-\ln|\cos x|+3x+5$

Section 5.6

1. F

3. They are superseded by the Trapezoidal Rule; it takes an equal amount of work and is generally more accurate.

5. (a) 250
   (b) 250
   (c) 250

7. (a) $2+\sqrt{2}+\sqrt{3}\approx 5.15$
   (b) $2/3(3+\sqrt{2}+2\sqrt{3})\approx 5.25$
   (c) $16/3\approx 5.33$

9. (a) 0.2207
   (b) 0.2005
   (c) $1/5$

11. (a) $9/2(1+\sqrt{3})\approx 12.294$
    (b) $3+6\sqrt{3}\approx 13.392$
    (c) $9\pi/2\approx 14.137$

13. Trapezoidal Rule: 3.0241
    Simpson's Rule: 2.9315

15. Trapezoidal Rule: 3.0695
    Simpson's Rule: 3.14295

17. Trapezoidal Rule: 2.52971
    Simpson's Rule: 2.5447

19. Trapezoidal Rule: 3.5472
    Simpson's Rule: 3.6133

21. (a) $n=150$ (using $\max\left(f''(x)\right)=1$)
    (b) $n=18$ (using $\max\left(f^{(4)}(x)\right)=7$)

23. (a) $n=5591$ (using $\max\left(f''(x)\right)=300$)
    (b) $n=46$ (using $\max\left(f^{(4)}(x)\right)=24$)

25. (a) Area is 25.0667 cm^2
    (b) Area is 250,667 yd^2

Chapter 6

Section 6.1

1. T

3. Determining which functions in the integrand to set equal to "u" and which to set equal to "dv".

5. $-e^{-x}-xe^{-x}+C$

7. $-x^3\cos x+3x^2\sin x+6x\cos x-6\sin x+C$

9. $x^3e^x-3x^2e^x+6xe^x-6e^x+C$

11. $-\frac{1}{2}xe^{-2x}-\frac{e^{-2x}}{4}+C$

13. $\frac{1}{5}e^{2x}(\sin x+2\cos x)+C$

15. $\frac{1}{13}e^{2x}(2\sin(3x)-3\cos(3x))+C$

17. $-\frac{1}{2}\cos^2 x+C$

19. $x\tan^{-1}(2x)-\frac{1}{4}\ln\left(4x^2+1\right)+C$

21. $x\cos^{-1}x-\sqrt{1-x^2}+C$

23. $-\frac{x^2}{4}+\frac{1}{2}x^2\ln x+2x-2x\ln x+C$

25. $\frac{1}{2}x^2\ln\left(x^2\right)-\frac{x^2}{2}+C$

27. $2\sqrt{x}\ln x-4\sqrt{x}+C$

29. $2x+(x+1)\left(\ln(x+1)\right)^2-(2x+2)\ln(x+1)+C$

31. $\ln|\sin(x)|-x\cot(x)+C$

33. $\frac{1}{3}(x^2-2)^{3/2}+C$

35. $x\sec x-\ln|\sec x+\tan x|+C$

37. $\frac{x^{n+1}\ln x}{n+1}-\frac{x^{n+1}}{(n+1)^2}+C$

39. $2\sin\left(\sqrt{x}\right)-2\sqrt{x}\cos\left(\sqrt{x}\right)+C$

41. $2\sqrt{x}e^{\sqrt{x}}-2e^{\sqrt{x}}+C$

43. π

45. 0

47. $1/2$

49. $\frac{98}{\ln 7}-\frac{48}{(\ln 7)^2}$

51. $\frac{1}{2}+\frac{e^{\pi}}{2}$

53. $xe^x\ln x-e^x+C$

55. $\sin x-x\cos x+9$

57. $\frac{1}{3}x^3\ln x-\frac{x^3}{9}+\frac{7e^3}{9}$

Section 6.2