

8.6 *Integration Tactics*

This section, currently in preparation, will be included in the official first printing of this edition. It will present a review of the integrations tactics presented earlier in the chapter, outline strategies for selecting an appropriate integration method to attempt to find an antiderivative of a given integrand, explore some more advanced (optional) integration techniques, and include integrands involving hyperbolic and inverse hyperbolic functions.

For the problems starting on the next page, use any integration technique you have learned so far to evaluate the given integrals.

8.6 Problems

1. $\int \sqrt{1-x} dx$
2. $\int (1+2x)^{2017} dx$
3. $\int x\sqrt{a^2-x^2} dx$
4. $\int x\sqrt{1-x} dx$
5. $\int \sqrt{a+bx} dx$
6. $\int \frac{1}{1+4x^2} dx$
7. $\int \frac{x}{1-x^4} dx$
8. $\int \frac{\sec^2(\theta)}{1+\tan(\theta)} d\theta$
9. $\int \frac{x^4+x^3+1}{x^3} dx$
10. $\int \frac{y^2}{\sqrt{1-y^3}} dy$
11. $\int \frac{(a^{\frac{2}{3}}-x^{\frac{2}{3}})^{\frac{3}{2}}}{x^{\frac{1}{3}}} dx$
12. $\int \frac{4x}{(a^2-x^2)^2} dx$
13. $\int (\sqrt{a}-\sqrt{x})^2 dx$
14. $\int \frac{3}{1-4x} dx$
15. $\int \frac{x^2}{\sqrt{1+x^3}} dx$
16. $\int \frac{2x-1}{2x+3} dx$
17. $\int \frac{e^x-e^{-x}}{e^x+e^{-x}} dx$
18. $\frac{1}{4} \int (e^{\frac{x}{2}}-e^{-\frac{x}{2}})^2 dx$
19. $\int \frac{x^3-x^2+2x-1}{1+x^2} dx$
20. $\int \frac{\sec^2(\varphi)}{\sqrt{1+\tan(\varphi)}} d\varphi$
21. $\int \frac{x^3-5x+7}{3x-4} dx$
22. $\int \frac{1}{e^t} dt$
23. $\int \frac{\sin(2\theta)}{a+b\cos(2\theta)} d\theta$
24. $\int \frac{1}{1+\sin(\varphi)} d\varphi$
25. $\int \frac{\sin(\theta)}{\cos^5(\theta)} d\theta$
26. $\int \frac{1}{4x^2+9} dx$
27. $\int \frac{1}{1-2x+2x^2} dx$
28. $\int \frac{x+1}{x^2+4} dx$
29. $\int \frac{x^2+x}{x^2+1} dx$
30. $\int \frac{e^y}{\sqrt{1-e^{2y}}} dy$
31. $\int \frac{e^{2t}}{\sqrt{1-e^{2t}}} dt$
32. $\int \frac{\sin(3\alpha)}{1+\cos^2(3\alpha)} d\alpha$
33. $\int \frac{1}{\sqrt{x}\sqrt{1-x}} dx$
34. $\int \frac{1}{x[1+(\ln(x))^2]} dx$
35. $\int \frac{x}{(1+x^2)^2} dx$
36. $\int x^{2017} \ln(x) dx$
37. $\int x^2 \arcsin(x) dx$
38. $\int t \tan^2(t) dt$
39. $\int x^3 \sqrt{a^2-x^2} dx$
40. $\int x^3 \sqrt{a^2-x^4} dx$
41. $\int \cos(\theta) \cdot \ln(\sin(\theta)) d\theta$
42. $\int \frac{x^2}{(9-x^2)^{\frac{3}{2}}} dx$
43. $\int \frac{x^2}{(1+x^2)^2} dx$
44. $\int \frac{y^3}{\sqrt{25-y^2}} dy$
45. $\int \frac{\sqrt{x}}{1+x} dx$

46. $\int \frac{1}{1-\sqrt{x}} dx$

49. $\int e^{2x} \sin(e^x) dx$

52. $\int \cos(\sqrt{t}) dt$

55. $\int \frac{x^3 - x}{2 + 3x} dx$

58. $\int \sin^2(2\varphi) \cos(2\varphi) d\varphi$

61. $\int \frac{x^2}{(1-x)^4} dx$

64. $\int \frac{1}{x [\ln(x)]^2} dx$

67. $\int \cos\left(\frac{x}{2}\right) dx$

70. $\int \left(a^{\frac{2}{3}} - y^{\frac{2}{3}}\right)^3 dy$

73. $\int \theta \sec^2(\theta) d\theta$

76. $\int_0^a y \left(b - \frac{b}{a}y\right)^3 dy$

79. $\int (1-x^3)^2 dx$

82. $\int \frac{x^3}{1+x^8} dx$

85. $\int [\ln(x)]^2 dx$

88. $\int \frac{x^2}{x^2-4} dx$

91. $\int \frac{x^3}{x^2+3x+2} dx$

94. $\int \frac{x^3-1}{x(x+1)^3} dx$

47. $\int \frac{x+3}{\sqrt{1+2x}} dx$

50. $\int x^3 e^{x^2} dx$

53. $\int x^2 \sqrt{1-x} dx$

56. $\int x \cos(3x) dx$

59. $\int \frac{1-e^{-x}}{1+e^{-x}} dx$

62. $\int \frac{1}{x^2+8x+20} dx$

65. $\int \frac{x^2}{\sqrt{1-x^6}} dx$

68. $\int e^{\tan(\theta)} \sec^2(\theta) d\theta$

71. $\int \frac{x+x^3}{\sqrt{4-x^4}} dx$

74. $\int \frac{\arctan(x)}{1+x^2} dx$

77. $\int \frac{x-x^2}{1+x^2} dx$

80. $\int x(a-x)^{\frac{5}{2}} dx$

83. $\int \frac{e^x}{1-3e^x} dx$

86. $\int \frac{1}{\sqrt{x}(1+x)} dx$

89. $\int \frac{2x^2+x-1}{x^3+x^2-4x-4} dx$

92. $\int \frac{x^4}{x^3+2x^2-x-2} dx$

95. $\int \frac{1}{x^3-x^2} dx$

48. $\int \frac{x}{(x+1)^2} dx$

51. $\int \frac{x^3}{(a^2+x^2)^2} dx$

54. $\int \frac{\sec^2(\theta) \tan^2(\theta)}{\sqrt{1+\tan(\theta)}} d\theta$

57. $\int \left[1 + \cos\left(\frac{\theta}{2}\right)\right]^3 \sin\left(\frac{\theta}{2}\right) d\theta$

60. $\int \frac{1}{(1-x)^4} dx$

63. $\int \cot(\theta) \cdot \ln(\sin(\theta)) d\theta$

66. $\int e^{2x} \sqrt{1-e^{2x}} dx$

69. $\int \frac{x^3+x^2+x}{x^2+9} dx$

72. $\int \frac{x^3}{(1-x^2)^2} dx$

75. $\int e^{\sqrt{x}} dx$

78. $\int e^{-x} (1+e^{-x})^3 dx$

81. $\int \frac{1}{x^2-6x+10} dx$

84. $\int \frac{\sqrt{1+\ln(x)}}{x} dx$

87. $\int x^5 e^{-x^3} dx$

90. $\int \frac{x}{1-x^4} dx$

93. $\int \frac{e^{3t}}{1-e^{2t}} dt$

96. $\int \frac{x^3-1}{x(x-2)^2} dx$

97. $\int \frac{1}{(x^2 + x)(x - 1)^2} dx$
98. $\int \frac{1}{e^{2y} - 2e^y} dy$
99. $\int \frac{x^2}{x^4 + 12x^3 + 52x^2 + 96x + 64} dx$
100. $\int \frac{x^2 + 4x + 10}{x^3 + 2x^2 + 5x} dx$
101. $\int \frac{x^2}{x^2 - 4x + 5} dx$
102. $\int \frac{1}{x^3 + 4x^2 + 8x} dx$
103. $\int \frac{x^2}{25 - x^4} dx$
104. $\int \frac{x}{1 - x^8} dx$
105. $\int \frac{x}{x^2 + x + 1} dx$
106. $\int \frac{x}{x^3 + x^2 + 4x + 4} dx$
107. $\int \frac{x^3}{(1 + x^2)^2} dx$
108. $\int \frac{x}{x^2 - 2x + 2} dx$
109. $\int \frac{1}{\tan(\theta) - \cot(\theta)} d\theta$
110. $\int \frac{x^2 - 2}{1 + 6x - x^3} dx$
111. $\int \frac{x^4 + 1}{(1 + x^2)^2} dx$
112. $\int_0^8 \frac{1}{1 + \sqrt[3]{x}} dx$
113. $\int_0^{\ln(2)} \sqrt{e^t - 1} dt$
114. $\int_0^4 \frac{1}{1 + \sqrt{x}} dx$
115. $\int_2^3 \frac{x}{1 - x^4} dx$
116. $\int \sqrt{25 - 9x^2} dx$
117. $\int \frac{1}{\sqrt{10x - x^2}} dx$
118. $\int \frac{x^2}{\sqrt{4x - x^2}} dx$
119. $\int \frac{1}{(9x^2 - 36x + 32)^{\frac{3}{2}}} dx$
120. $\int \frac{(1 - x^2)^{\frac{3}{2}}}{x^6} dx$
121. $\int_0^{\frac{\pi}{2}} \cos(2\varphi) \cos(5\varphi) d\varphi$
122. $\int \frac{\cos^3(\theta)}{\sin^4(\theta)} d\theta$
123. $\int \sin(\varphi) \sin(3\varphi) \sin(5\varphi) d\varphi$
124. $\int \tan(x) \sqrt{\sec(x)} dx$
125. $\int x \cosh(x) dx$
126. $\int x^2 \sinh(x) dx$
127. $\int e^x \sinh(x) dx$
128. $\int \tanh(x) dx$
129. $\int \coth(x) dx$
130. $\int \operatorname{sech}(x) dx$
131. $\int \operatorname{argtanh}(x) dx$
132. $\int \operatorname{argsinh}(x) dx$
133. $\int x \operatorname{argsinh}(x) dx$