

Practice Problems

Integrals

Substitution

1. $\int e^{5x} dx$
2. $\int \sin ax dx$
3. $\int \frac{\ln(x+1)}{x+1} dx$
4. $\int \frac{x}{x^2+1} dx$
5. $\int \frac{\ln x}{x} dx$
6. $\int \sqrt{x^2+1} \cdot x dx$

Integration By Parts

1. $\int x e^x dx$
2. $\int x \ln x dx$
3. $\int x \sin x dx$
4. $\int \ln x dx$
5. $\int \sin^{-1} x dx$
6. $\int \ln(1-x) dx$
7. $\int x \cos^2 x dx$

Trig Functions

1. $\int \sin^3 x \cos^2 x dx$
2. $\int \sin^4 x dx$
3. $\int \tan^3 x dx$
4. $\int \sec^3 x dx$
5. $\int \frac{\cos x}{\sin^2 x} dx$
6. $\int \frac{\sin x}{\cos^3 x} dx$
7. $\int \frac{\tan x}{\cos^2 x} dx$
8. $\int \sqrt{\sin x} \cos x dx$
9. $\int \tan^6 x \sec^4 x dx$

10. $\int \tan^5 x \sec^7 x dx$

Partial Fractions

1. $\int \frac{1}{x^2-6x+5} dx$
2. $\int \frac{2x-1}{(x-1)(x-2)} dx$
3. $\int \frac{x}{(x+1)(x+3)(x+5)} dx$
4. $\int_0^1 \frac{x-4}{x^2-5x+6} dx$
5. $\int \frac{1}{(x^2-1)^2} dx$
6. $\int \frac{10}{(x-1)(x^2+9)} dx$
7. $\int \frac{x+4}{x^2+2x+5} dx$
8. $\int_2^3 \frac{x(3-5x)}{(3x-1)(x-1)^2} dx$
9. $\int \frac{x^4+9x^2+x+2}{x^2+9} dx$
10. $\int_0^1 \frac{x^3+2x}{x^4+4x^2+3} dx$
11. $\int \frac{1}{(x-1)^2(x-2)} dx$
12. $\int \frac{x^2+2x-1}{2x^3+3x^2-2x} dx$
13. $\int \frac{3x-2}{5x^2-3x+2} dx$
14. $\int \frac{x-8}{x^3-4x^2+4x} dx$
15. $\int \frac{2x^2-x+4}{x^3+4x} dx$
16. $\int \frac{\sqrt{x+4}}{x} dx$
17. $\int \frac{x^2}{(x+2)^2(x+4)^2} dx$
18. $\int \frac{2x^2-3x-3}{(x-1)(x^2-2x+5)} dx$

Rationalising substitutions

1. $\int \frac{1}{x\sqrt{x-1}} dx$
2. $\int_0^1 \frac{1}{1+\sqrt[3]{x}} dx$
3. $\int \frac{1}{\sqrt{x}-\sqrt[3]{x}} dx$

Trig Substitution

1. $\int \frac{1}{1+2x^2} dx$
2. $\int x^2 \sqrt{4-x^2} dx$
3. $\int \frac{1}{\sqrt{9-x^2}} dx$
4. $\int \frac{1}{x^2 \sqrt{x^2-16}} dx$
5. $\int_0^1 \sqrt{x-x^2} dx$
6. $\int \frac{1}{\sqrt{16-9x^2}} dx$
7. $\int \frac{1}{x^2+4} dx$
8. $\int \frac{1}{\sqrt{2-3x-4x^2}} dx$
9. $\int \frac{1}{\sqrt{5-7x-3x^2}} dx$
10. $\int \frac{1}{\sqrt{1+x+x^2}} dx$
11. $\int \frac{x^2}{(3+4x-4x^2)^{3/2}} dx$
12. $\int \frac{1}{\sqrt{2-3x-x^2}} dx$
13. $\int \frac{1}{\sqrt{5x^2-x-1}} dx$
14. $\int \frac{x+3}{\sqrt{4x^2+4x+3}} dx$
15. $\int \frac{x+3}{\sqrt{-4x^2+4x+3}} dx$
16. $\int \frac{3x+5}{\sqrt{x(2x-1)}} dx$

More Practice

1. $\int \sin^3 x \, dx$

2. $\int \cos^2 x \, dx$

3. $\int \tan^5 x \, dx$

4. $\int \frac{\cos x}{\sqrt{2 \sin x + 1}} \, dx$

5. $\int \frac{\sin 2x}{(1 + \cos 2x)^2} \, dx$

6. $\int \frac{\sin 2x}{\sqrt{1 + \sin^2 x}} \, dx$

7. $\int \frac{\ln^2 x}{x} \, dx$

8. $\int \frac{1}{3x-7} \, dx$

9. $\int \tan x \, dx$

10. $\int \tan \theta \cdot \sec^2 \theta \, d\theta$

11. $\int (\tan e^x) e^x \, dx$

12. $\int \frac{1}{x \ln x} \, dx$

13. $\int 2x(x^2 + 1)^4 \, dx$

14. $\int \cos(a + bx) \, dx$

15. $\int e^{2x} \, dx$

16. $\int e^{\frac{x}{3}} \, dx$

17. $\int e^{\sin x} \cos x \, dx$

18. $\int e^{5x} + a^{5x} \, dx$

19. $\int a^{x^2} x \, dx$

20. $\int (e^{2x})^2 \, dx$

21. $\int \frac{e^x}{3+4e^x} \, dx$

22. $\int \frac{e^{2x}}{2+e^{2x}} \, dx$

23. $\int \frac{6x-7}{3x^2-7x+11} \, dx$

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

25. $\int \frac{7x+1}{6x^2+x-1} \, dx$

26. $\int \frac{x}{x^4+a^4} \, dx$

27. $\int \frac{x}{\sqrt{2x^2+3}} \, dx$

28. $\int \frac{x^2}{\sqrt{x^3+1}} \, dx$

29. $\int \tan^4 x \, dx$

30. $\int \frac{\sqrt{a^2-x^2}}{x^2} \, dx$

31. $\int \frac{1}{x^2\sqrt{1+x^2}} \, dx$

32. $\int \frac{\sqrt{x}}{\sqrt[4]{x^3+1}} \, dx$

33. $\int \frac{2+\sqrt[3]{x}}{\sqrt[6]{x}+\sqrt[3]{x}+\sqrt{x+1}} \, dx$

34. $\int x^n \ln x \, dx$

Past Exam Problems

Integrals

1. $\int \frac{1}{\sqrt{x^2-6x+13}} dx$
2. $\int \frac{x^2-3x+8}{x^2(x-2)} dx$
3. $\int_1^8 \frac{\ln(x)}{\sqrt[3]{x}} dx$
4. $\int \frac{\tan^3(x)}{\cos^4(x)} dx$
5. $\int \cos(\sqrt{x}) dx$
6. $\int \frac{x^2}{\sqrt{9-x^2}} dx$
7. $\int \frac{9x^2}{(x-1)^2(x+2)} dx$
8. $\int \tan^{10}(2x) \sec^4(2x) dx$
9. $\int_0^{\pi^2/16} \sin(\sqrt{x}) dx$
10. $\int \frac{1}{(x^2+6x+25)^{3/2}} dx$
11. $\int_0^1 \frac{1}{e^x+1} dx$
12. $\int \sqrt{4-x^2} dx$
13. $\int \frac{x-1}{x^3-2x^2} dx$
14. $\int x \tan^{-1}(x) dx$
15. $\int \frac{x^2}{(x^2+4)^{3/2}} dx$
16. $\int \frac{\ln(x)}{x^5} dx$
17. $\int x^2 \sin^2(x^3) \cos^2(x^3) dx$
18. $\int \frac{x}{x^2+6x+13} dx$
19. $\int_0^4 \sqrt{x} e^{\sqrt{x}} dx$
20. $\int \frac{x+9}{x^3+3x^2} dx$
21. $\int \frac{x}{(x^2+4x+13)^{3/2}} dx$
22. $\int \frac{\cos(x) \sin(x)}{2\sqrt[3]{\sin(x)+2}} dx$
23. $\int_0^{\pi/4} \cos^4(x) dx$
24. $\int \frac{x^4+x+1}{x^2+9} dx$
25. $\int \tan^3(5x) \sec^3(5x) dx$
26. $\int \sin^{-1}(x) dx$
27. $\int_0^{\pi/2} \frac{\cos(x) \sin^2(x)}{\sin^2(x)+1} dx$
28. $\int \sqrt{27+6x-x^2} dx$
29. $\int \frac{3x-2}{(x-1)(x+2)^2} dx$
30. $\int \frac{1}{(4+x^2)^{3/2}} dx$
31. $\int_0^{\pi^2} \sin(\frac{\sqrt{x}}{4}) dx$
32. $\int \frac{5}{(x^2+9)^{3/2}} dx$
33. $\int \frac{x-8}{x^3+4x^2} dx$
34. $\int \frac{1}{\sqrt{x^2+6x+5}} dx$
35. $\int \ln(1+x^2) dx$
36. $\int_0^{\pi/8} \sec^4(2x) \tan^3(2x) dx$
37. $\int \tan^{-1}(x) dx$
38. $\int \frac{x^2-6}{2x^2-x^3} dx$
39. $\int \frac{x}{(x^2+4x+13)^{3/2}} dx$
40. $\int_0^{\pi/2} \cos^4(x) \sin^3(x) dx$
41. $\int \frac{\sqrt{x}}{\sqrt{x+3}} dx$
42. $\int_1^e 9\sqrt{x} \ln(x) dx$
43. $\int_0^1 \frac{x+1}{x^2+4} dx$
44. $\int \sqrt{16-6x-x^2} dx$
45. $\int \frac{x+1}{x^3+3x^2} dx$
46. $\int \sec^4(x) \tan^3(x) dx$
47. $\int_1^4 \sqrt{y} \ln(\sqrt{y}) dy$
48. $\int \frac{4x-15}{x^3-5x^2} dx$
49. $\int \frac{x}{\sqrt{x^2+8x+25}} dx$
50. $\int_1^4 \frac{y \ln(\sqrt{y})}{\sqrt{y}} dy$
51. $\int \frac{7x+3}{(x-1)(x^2+1)} dx$
52. $\int \frac{x}{\sqrt{x^2+8x+25}} dx$
53. $\int \frac{2x+1}{x^2+3x-10} dx$
54. $\int_1^9 \sqrt{x} \ln(x) dx$
55. $\int \frac{\sin^2(x) \tan(x)}{\sec(x)} dx$
56. $\int \frac{1}{\sqrt{x^2-2x-8}} dx$
57. $\int \frac{\ln(x) \cos(3 \ln(x))}{x} dx$
58. $\int_1^4 x \sqrt{x^2-1} dx$
59. $\int_1^e x \ln(x) dx$
60. $\int \sin^2(x) \cos^3(x) dx$
61. $\int \frac{e^x}{e^{2x}-4} dx$
62. $\int \frac{1}{(4-x^2)^{3/2}} dx$
63. $\int \frac{x+2}{x(x+1)^2} dx$
64. $\int \frac{1}{\sqrt{x^2+8x+7}} dx$
65. $\int \frac{x^3+1}{x^2-5x} dx$
66. $\int \tan^4(3x) \sec^4(3x) dx$
67. $\int \frac{1}{(x^2+25)^{3/2}} dx$
68. $\int_0^\infty x e^{-5x} dx$
69. $\int \frac{\cos^3(\ln(x))}{x} dx$
70. $\int \frac{x}{\sqrt{40-6x-x^2}} dx$
71. $\int \frac{\sqrt{x}}{x-9} dx$
72. $\int \frac{\tan^5 x}{\sec^8 x} dx$
73. $\int \frac{x+3}{(x+1)(x+2)^2} dx$
74. $\int \frac{x^5}{\sqrt{1-x^2}} dx$
75. $\int x^2 \ln(x^2+1) dx$
76. $\int \frac{x}{\sqrt{2+2x-x^2}} dx$
77. $\int_0^\infty \frac{1}{x\sqrt{x^2+1}} dx$
78. $\int \frac{x^2}{(2x+1)(x-1)} dx$
79. $\int \frac{x^3}{\sqrt{1-x^2}} dx$

$$80. \int \sqrt{x} \sin \sqrt{x} \, dx$$

$$81. \int \frac{1}{(x^2-4x+12)^{5/2}} \, dx$$

$$82. \int_{-1}^1 \frac{1}{e^x-1} \, dx$$

$$83. \int_0^\infty e^{-x} \sin x \, dx$$

$$84. \int \frac{x}{x^2+4x-5} \, dx$$

$$85. \int \frac{1}{x\sqrt{4-2x^2}} \, dx$$

$$86. \int e^x \cos(3x) \, dx$$

$$87. \int \tan^4 x \sec^4 x \, dx$$

$$88. \int \frac{x^2+2x}{x^2-1} \, dx$$

$$89. \int \frac{1}{(7+6x-x^2)^{3/2}} \, dx$$

$$90. \int_{-\infty}^\infty \frac{|x|}{(x^2+1)^{3/2}} \, dx$$

$$91. \int_0^1 x^2 (\ln x)^2 \, dx$$