

## 7.5 Exercises

1–82 Evaluate the integral.

1.  $\int \cos x (1 + \sin^2 x) dx$
2.  $\int_0^1 (3x + 1)^{\sqrt{2}} dx$
3.  $\int \frac{\sin x + \sec x}{\tan x} dx$
4.  $\int \frac{\sin^3 x}{\cos x} dx$
5.  $\int \frac{t}{t^4 + 2} dt$
6.  $\int_0^1 \frac{x}{(2x + 1)^3} dx$
7.  $\int_{-1}^1 \frac{e^{\arctan y}}{1 + y^2} dy$
8.  $\int t \sin t \cos t dt$
9.  $\int_1^3 r^4 \ln r dr$
10.  $\int_0^4 \frac{x - 1}{x^2 - 4x - 5} dx$
11.  $\int \frac{x - 1}{x^2 - 4x + 5} dx$
12.  $\int \frac{x}{x^4 + x^2 + 1} dx$
13.  $\int \sin^5 t \cos^4 t dt$
14.  $\int \frac{x^3}{\sqrt{1 + x^2}} dx$
15.  $\int \frac{dx}{(1 - x^2)^{3/2}}$
16.  $\int_0^{\sqrt{2}/2} \frac{x^2}{\sqrt{1 - x^2}} dx$
17.  $\int_0^{\pi} t \cos^2 t dt$
18.  $\int_1^4 \frac{e^{\sqrt{t}}}{\sqrt{t}} dt$
19.  $\int e^{+e^x} dx$
20.  $\int e^2 dx$
21.  $\int \arctan \sqrt{x} dx$
22.  $\int \frac{\ln x}{x\sqrt{1 + (\ln x)^2}} dx$
23.  $\int_0^1 (1 + \sqrt{x})^8 dx$
24.  $\int_0^4 \frac{6z + 5}{2z + 1} dz$
25.  $\int \frac{3x^2 - 2}{x^2 - 2x - 8} dx$
26.  $\int \frac{3x^2 - 2}{x^3 - 2x - 8} dx$
27.  $\int \frac{dx}{1 + e^x}$
28.  $\int \sin \sqrt{at} dt$
29.  $\int \ln(x + \sqrt{x^2 - 1}) dx$
30.  $\int_{-1}^2 |e^x - 1| dx$
31.  $\int \sqrt{\frac{1 + x}{1 - x}} dx$
32.  $\int \frac{\sqrt{2x - 1}}{2x + 3} dx$
33.  $\int \sqrt{3 - 2x - x^2} dx$
34.  $\int_{\pi/4}^{\pi/2} \frac{1 + 4 \cot x}{4 - \cot x} dx$
35.  $\int \cos 2x \cos 6x dx$
36.  $\int_{-\pi/4}^{\pi/4} \frac{x^2 \tan x}{1 + \cos^4 x} dx$
37.  $\int_0^{\pi/4} \tan^3 \theta \sec^2 \theta d\theta$
38.  $\int_{\pi/6}^{\pi/3} \frac{\sin \theta \cot \theta}{\sec \theta} d\theta$
39.  $\int \frac{\sec \theta \tan \theta}{\sec^2 \theta - \sec \theta} d\theta$
40.  $\int \frac{1}{\sqrt{4y^2 - 4y - 3}} dy$
41.  $\int \theta \tan^2 \theta d\theta$
42.  $\int \frac{\tan^{-1} x}{x^2} dx$
43.  $\int \frac{\sqrt{x}}{1 + x^3} dx$
44.  $\int \sqrt{1 + e^x} dx$
45.  $\int x^5 e^{-x^2} dx$
46.  $\int \frac{(x - 1)e^x}{x^2} dx$
47.  $\int x^3(x - 1)^{-4} dx$
48.  $\int_0^1 x\sqrt{2 - \sqrt{1 - x^2}} dx$
49.  $\int \frac{1}{x\sqrt{4x + 1}} dx$
50.  $\int \frac{1}{x^2\sqrt{4x + 1}} dx$
51.  $\int \frac{1}{x\sqrt{4x^2 + 1}} dx$
52.  $\int \frac{dx}{x(x^4 + 1)}$



53.  $\int x^2 \sinh mx \, dx$

55.  $\int \frac{dx}{x + x\sqrt{x}}$

57.  $\int x\sqrt[3]{x+c} \, dx$

59.  $\int \cos x \cos^3(\sin x) \, dx$

61.  $\int \frac{d\theta}{1 + \cos \theta}$

63.  $\int \sqrt{x} e^{\sqrt{x}} \, dx$

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

67.  $\int \frac{1}{\sqrt{x+1} + \sqrt{x}} \, dx$

69.  $\int_1^{\sqrt{3}} \frac{\sqrt{1+x^2}}{x^2} \, dx$

71.  $\int \frac{e^{2x}}{1+e^x} \, dx$

54.  $\int (x + \sin x)^2 \, dx$

56.  $\int \frac{dx}{\sqrt{x} + x\sqrt{x}}$

58.  $\int \frac{x \ln x}{\sqrt{x^2-1}} \, dx$

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

62.  $\int \frac{d\theta}{1 + \cos^2 \theta}$

64.  $\int \frac{1}{\sqrt{\sqrt{x}+1}} \, dx$

66.  $\int_{\pi/4}^{\pi/3} \frac{\ln(\tan x)}{\sin x \cos x} \, dx$

68.  $\int \frac{x^2}{x^6 + 3x^3 + 2} \, dx$

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

72.  $\int \frac{\ln(x+1)}{x^2} \, dx$

73.  $\int \frac{x + \arcsin x}{\sqrt{1-x^2}} \, dx$

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

77.  $\int \frac{xe^x}{\sqrt{1+e^x}} \, dx$

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

81.  $\int \sqrt{1 - \sin x} \, dx$

74.  $\int \frac{4^x + 10^x}{2^x} \, dx$

76.  $\int \frac{dx}{\sqrt{x}(2 + \sqrt{x})^4}$

78.  $\int \frac{1 + \sin x}{1 - \sin x} \, dx$

80.  $\int \frac{\sec x \cos 2x}{\sin x + \sec x} \, dx$

82.  $\int \frac{\sin x \cos x}{\sin^4 x + \cos^4 x} \, dx$

83. The functions  $y = e^{x^2}$  and  $y = x^2 e^{x^2}$  don't have elementary antiderivatives, but  $y = (2x^2 + 1)e^{x^2}$  does. Evaluate  $\int (2x^2 + 1)e^{x^2} \, dx$ .

84. We know that  $F(x) = \int_0^x e^{e^t} \, dt$  is a continuous function by FTC1, though it is not an elementary function. The functions

$$\int \frac{e^x}{x} \, dx \quad \text{and} \quad \int \frac{1}{\ln x} \, dx$$

are not elementary either, but they can be expressed in terms of  $F$ . Evaluate the following integrals in terms of  $F$ .

(a)  $\int_1^2 \frac{e^x}{x} \, dx$

(b)  $\int_2^3 \frac{1}{\ln x} \, dx$