

NOT {37-47, 35}  
 else as many as poss.

[06-12-11-512]

MATH

EXERCISES 5.5

1-6 ■ Evaluate the integral by making the given substitution.

- 1.  $\int x(x^2 - 1)^{99} dx, u = x^2 - 1$
- 2.  $\int \frac{x^2}{\sqrt{2 + x^3}} dx, u = 2 + x^3$
- 3.  $\int \sin 4x dx, u = 4x$
- 4.  $\int \frac{dx}{(2x + 1)^2}, u = 2x + 1$
- 5.  $\int \frac{x + 3}{(x^2 + 6x)^2} dx, u = x^2 + 6x$
- 6.  $\int \sec a\theta \tan a\theta d\theta, u = a\theta$

7-48 ■ Evaluate the indefinite integral.

- 7.  $\int (2x + 1)(x^2 + x + 1)^3 dx$
- 8.  $\int x^3(1 - x^4)^5 dx$
- 9.  $\int \sqrt{x - 1} dx$
- 10.  $\int \sqrt[3]{1 - x} dx$
- 11.  $\int x^3 \sqrt{2 + x^4} dx$
- 12.  $\int x(x^2 + 1)^{3/2} dx$
- 13.  $\int \frac{2}{(t + 1)^6} dt$
- 14.  $\int \frac{1}{(1 - 3t)^4} dt$
- 15.  $\int (1 - 2y)^{1/3} dy$
- 16.  $\int \sqrt[3]{3 - 5y} dy$
- 17.  $\int \cos 2\theta d\theta$
- 18.  $\int \sec^2 3\theta d\theta$
- 19.  $\int \frac{x}{\sqrt[4]{x + 2}} dx$
- 20.  $\int \frac{x^2}{\sqrt{1 - x}} dx$
- 21.  $\int t \sin(t^2) dt$
- 22.  $\int \frac{(1 + \sqrt{x})^9}{\sqrt{x}} dx$
- 23.  $\int x^3(1 - x^2)^{3/2} dx$
- 24.  $\int t^2 \cos(1 - t^3) dt$
- 25.  $\int \sec x \tan x \sqrt{1 + \sec x} dx$
- 26.  $\int \frac{\cos \sqrt{x}}{\sqrt{x}} dx$
- 27.  $\int \cos^4 x \sin x dx$
- 28.  $\int \frac{ax + b}{\sqrt{ax^2 + 2bx + c}} dx$
- 29.  $\int \sin(2x + 3) dx$
- 30.  $\int \cos(7 - 3x) dx$
- 31.  $\int (\sin 3\alpha - \sin 3x) dx$
- 32.  $\int \sqrt[3]{x^3 + 1} x^5 dx$
- 33.  $\int x^a \sqrt{b + cx^{a+1}} dx \quad (c \neq 0, a \neq -1)$

- 34.  $\int \cos x \cos(\sin x) dx$
- 35.  $\int \frac{dx}{2x - 1}$
- 36.  $\int \frac{x}{x^2 + 1} dx$
- 37.  $\int \frac{(\ln x)^2}{x} dx$
- 38.  $\int xe^{x^2} dx$
- 39.  $\int e^{x(1 + e^x)^{10}} dx$
- 40.  $\int \frac{\tan^{-1} x}{1 + x^2} dx$
- 41.  $\int \frac{dx}{x \ln x}$
- 42.  $\int e^x \sin(e^x) dx$
- 43.  $\int \frac{e^x + 1}{e^x} dx$
- 44.  $\int \frac{e^x}{e^x + 1} dx$
- 45.  $\int \frac{x + 1}{x^2 + 2x} dx$
- 46.  $\int \frac{\sin x}{1 + \cos^2 x} dx$
- 47.  $\int \frac{1 + x}{1 + x^2} dx$
- 48.  $\int \frac{x}{1 + x^4} dx$

49-52 ■ Evaluate the indefinite integral. Illustrate and check that your answer is reasonable by graphing both the function and its antiderivative (take  $C = 0$ ).

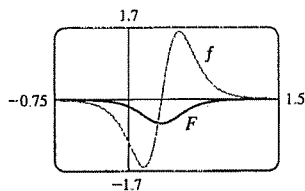
- 49.  $\int \frac{3x - 1}{(3x^2 - 2x + 1)^4} dx$
- 50.  $\int \frac{x}{\sqrt{x^2 + 1}} dx$
- 51.  $\int \sin^3 x \cos x dx$
- 52.  $\int \tan^2 \theta \sec^2 \theta d\theta$

53-74 ■ Evaluate the definite integral, if it exists.

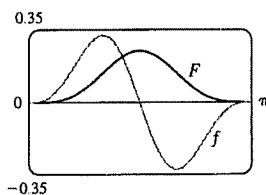
- 53.  $\int_0^1 (2x - 1)^{100} dx$
- 54.  $\int_0^{-4} \sqrt{1 - 2x} dx$
- 55.  $\int_0^1 (x^4 + x)^5(4x^3 + 1) dx$
- 56.  $\int_2^3 \frac{3x^2 - 1}{(x^3 - x)^2} dx$
- 57.  $\int_1^2 x \sqrt{x - 1} dx$
- 58.  $\int_0^4 \frac{x}{\sqrt{1 + 2x}} dx$
- 59.  $\int_0^1 \cos \pi t dt$
- 60.  $\int_0^{\pi/4} \sin 4t dt$
- 61.  $\int_1^4 \frac{1}{x^2} \sqrt{1 + \frac{1}{x}} dx$
- 62.  $\int_0^2 \frac{dx}{(2x - 3)^2}$
- 63.  $\int_0^{\pi/3} \frac{\sin \theta}{\cos^2 \theta} d\theta$
- 64.  $\int_{-\pi/2}^{\pi/2} \frac{x^2 \sin x}{1 + x^6} dx$
- 65.  $\int_0^{13} \frac{dx}{\sqrt[3]{(1 + 2x)^2}}$
- 66.  $\int_{-\pi/3}^{\pi/3} \sin^5 \theta d\theta$
- 67.  $\int_0^4 \frac{dx}{(x - 2)^3}$
- 68.  $\int_0^a x \sqrt{a^2 - x^2} dx$
- 69.  $\int_0^a x \sqrt{x^2 + a^2} dx \quad (a > 0)$
- 70.  $\int_{-a}^a x \sqrt{x^2 + a^2} dx$

## Exercises 5.5 ■ page 365

1.  $(x^2 - 1)^{100}/200 + C$     3.  $-\frac{1}{4} \cos 4x + C$   
 5.  $-1/[2(x^2 + 6x)] + C$     7.  $(x^2 + x + 1)^4/4 + C$   
 9.  $\frac{2}{3}(x - 1)^{3/2} + C$     11.  $(2 + x^4)^{3/2}/6 + C$   
 13.  $-2/[5(t + 1)^3] + C$     15.  $-(1 - 2y)^{2/3}/4.6 + C$   
 17.  $\frac{1}{2} \sin 2\theta + C$     19.  $\frac{4}{7}(x + 2)^{7/4} - \frac{8}{3}(x + 2)^{3/4} + C$   
 21.  $-\frac{1}{2} \cos(t^2) + C$     23.  $\frac{1}{7}(1 - x^2)^{7/2} - \frac{1}{5}(1 - x^2)^{5/2} + C$   
 25.  $\frac{2}{3}(1 + \sec x)^{3/2} + C$     27.  $-\frac{1}{3} \cos^5 x + C$   
 29.  $-\frac{1}{2} \cos(2x + 3) + C$     31.  $(\sin 3\alpha)x + \frac{1}{3} \cos 3x + C$   
 33.  $2(b + cx^{a+1})^{3/2}/[3c(a + 1)] + C$   
 35.  $\frac{1}{2} \ln |2x - 1| + C$     37.  $(\ln x)^3/3 + C$   
 39.  $(1 + e^x)^{11}/11 + C$     41.  $\ln |\ln x| + C$   
 43.  $x - e^{-x} + C$     45.  $\frac{1}{2} \ln |x^2 + 2x| + C$   
 47.  $\tan^{-1}x + \frac{1}{2} \ln(1 + x^2) + C$   
 49.  $\frac{-1}{6(3x^2 - 2x + 1)^3} + C$



51.  $\frac{1}{4} \sin^4 x + C$



53.  $\frac{1}{101}$     55.  $\frac{32}{3}$     57.  $\frac{16}{15}$     59. 0  
 61.  $(4\sqrt{2}/3) - (5\sqrt{5}/12)$     63. 1    65. 3  
 67. Does not exist    69.  $\frac{1}{3}(2\sqrt{2} - 1)a^3$     71.  $\frac{1}{2} \ln 3$   
 73. 2    75.  $\sqrt{3} - \frac{1}{3}$     77.  $6\pi$   
 79.  $[5/(4\pi)][1 - \cos(2\pi t/5)] L$     81. 5    87.  $\pi^2/4$