

Name _____

Perform the integration.

1) $\int (x - 7)^5 dx$

2) $\int \frac{7x^6 dx}{(8 + x^7)^4}$

3) $\int \frac{dx}{\sqrt{x}(\sqrt{x} - 7)}$

4) $\int_0^{\pi/8} \frac{\sec^2 2x}{3 + \tan 2x} dx$

5) $\int \frac{\cos(\ln x - 9)}{x} dx$

6) $\int \csc^2 5\theta \cot 5\theta d\theta$

7) $\int \sin^2 x \cos x dx$

Use integration by parts to evaluate the integral.

$$8) \int \cos^{-1} x \, dx$$

$$9) \int 4xe^x \, dx$$

$$10) \int_2^4 6x \ln x \, dx$$

$$11) \int (2x - 1) \ln(6x) \, dx$$

$$12) \int \frac{\sin(2t + 3)}{1 - \sin^2(2t + 3)} \, dt$$

$$13) \int \frac{dx}{\sqrt{1 - 16x^2}}$$

$$14) \int \frac{x \, dx}{1 + 25x^4}$$

$$15) \int -6x \cos 2x \, dx$$

Apply integration by parts more than once to evaluate the integral.

$$16) \int y^2 \sin 6y \, dy$$

$$17) \int e^{2x} x^2 \, dx$$

Use integration by parts to establish a reduction formula for the integral.

$$18) \int \cos^n x \, dx$$

$$19) \int_0^{\pi/4} \sin^7 y \, dy$$

$$20) \int 8 \cos^3 2x \, dx$$

$$21) \int \sin 5x \cos 2x \, dx$$

$$22) \int \sin 7t \sin 2t \, dt$$

$$23) \int \cos 8x \cos 5x \, dx$$

$$24) \int 3 \cos^3 x \sin^5 x \, dx$$

$$25) \int 2 \sin^3 x \cos^5 x \, dx$$

$$26) \int_0^{\pi/3} \tan x \sec^4 x \, dx$$

$$27) \int 2 \csc^3 x \cot x \, dx$$

$$28) \int \sqrt{49 - x^2} \, dx$$

$$29) \int \frac{dx}{(x^2 + 81)^{3/2}}$$

$$30) \int \frac{dx}{x^2 \sqrt{x^2 - 25}}, \, x > 5$$

Use the method of completing the square, along with a trigonometric substitution if needed, to evaluate the integral.

$$31) \int_0^5 \frac{dx}{x^2 + 12x + 40}$$

Integrate the function.

$$32) \int \frac{x^3}{\sqrt{x^2+9}} dx$$

Use the method of partial decomposition to perform the required integration.

$$33) \int \frac{5x+43}{x^2+10x+21} dx$$

$$34) \int \frac{5x-7}{x^2-4x-5} dx$$

$$35) \int \frac{2x^2+10x+36}{(x+5)(x-1)(x+3)} dx$$

$$36) \int_3^4 \frac{3x+15}{2x^2+7x+5} dx$$

$$37) \int \frac{8x^2+x+112}{x^3+16x} dx$$

$$38) \int_4^8 \frac{3x dx}{(x-5)^3}$$

$$39) \int \frac{5x^3 + 37x^2 + 90x + 70}{(x+3)(x+2)^3} dx$$

$$40) \int \frac{\cos t dt}{\sin^2 t - 6 \sin t + 5}$$

Evaluate the integral by first performing long division on the integrand and then writing the proper fraction as a sum of partial fractions.

$$41) \int \frac{x^4}{x^2 - 25} dx$$

$$42) \int \frac{3x^3 + 9x^2 - 2x - 5}{x^3 - x^2} dx$$

Evaluate the integral.

$$43) \int \frac{dx}{x (\ln x)^6}$$

$$44) \int_0^{\pi/2} \cos^2 3x \sin^3 3x dx$$

45) Use Table of Integrals

$$\int \frac{\sqrt{3x-7}}{x^2} dx$$

46) Use Table of Integrals

$$\int \frac{dx}{(16-x^2)^2}$$

Evaluate the integral by making a substitution and then using a table of integrals.

$$47) \int e^x \sqrt{36-e^{2x}} dx$$

$$48) \int \frac{e^{2x}}{5e^x+4} dx$$

$$49) \int \sqrt{4-x^2} dx$$

Use reduction formulas to evaluate the integral.

$$50) \int 6 \cos^3 5x dx$$

Use the Trapezoidal Rule with $n = 4$ steps to estimate the integral.

$$51) \int_0^2 6x^2 dx$$

$$52) \int_0^1 \frac{7}{1+x} dx$$

$$53) \int_{-\pi}^0 \sin x \, dx$$

Use Simpson's Rule with $n = 4$ steps to estimate the integral.

$$54) \int_1^3 (4x+4) \, dx$$

$$55) \int_{-\pi}^0 \sin x \, dx$$

Solve the problem.

56) Estimate the minimum number of subintervals needed to approximate the integral

$$\int_1^3 (4x^4 - 3x) \, dx$$

with an error of magnitude less than 10^{-4} using Simpson's Rule.

57) Estimate the minimum number of subintervals needed to approximate the integral

$$\int_2^4 \frac{1}{x-1} \, dx$$

with an error of magnitude less than 10^{-4} using Simpson's Rule.

Evaluate the improper integral or state that it is divergent.

$$58) \int_6^{\infty} \frac{dx}{x^2 - 25}$$

$$59) \int_{-\infty}^0 \frac{18}{(x-1)^2} dx$$

$$60) \int_0^{\infty} 15e^{-15x} dx$$

$$61) \int_{-\infty}^0 14xe^{3x} dx$$

$$62) \int_0^{\infty} 6xe^{2x} dx$$

Find the area or volume.

63) Find the area of the region in the first quadrant between the curve $y = e^{-5x}$ and the x-axis.

64) Find the area under $y = \frac{7}{1+x^2}$ in the first quadrant.

Answer Key

Testname: MATH3B_HWCH7_INTEGRATION

1) $\frac{1}{6}(x - 7)^6 + C$

Objective: (7.1) Evaluate Integral By Substitution I

2) $-\frac{1}{3(8 + x^7)^3} + C$

Objective: (7.1) Evaluate Integral By Substitution I

3) $2 \ln |\sqrt{x} - 7| + C$

Objective: (7.1) Evaluate Integral By Substitution I

4) $\frac{1}{2} \ln \frac{4}{3}$

Objective: (7.1) Evaluate Integral By Substitution II

5) $\sin(\ln x - 9) + C$

Objective: (7.1) Evaluate Integral By Substitution II

6) $-\frac{1}{10} \cot^2 5\theta + C$

Objective: (7.1) Evaluate Integral By Substitution II

7) $\frac{\sin^3 x}{3} + C$

Objective: (7.1) Evaluate Integral By Substitution II

8) $x \cos^{-1} x - \sqrt{1 - x^2} + C$

Objective: (7.2) Evaluate Integral Using Integration by Parts I

9) $4xe^x - 4e^x + C$

Objective: (7.2) Evaluate Integral Using Integration by Parts II

10) 40.2

Objective: (7.2) Evaluate Integral Using Integration by Parts II

11) $(x^2 - x) \ln 6x - \frac{x^2}{2} + x + C$

Objective: (7.2) Evaluate Integral Using Integration by Parts II

12) $\frac{1}{2 \cos(2t + 3)} + C$

Objective: (7.1) Evaluate Integral By Substitution II

13) $\frac{1}{4} \sin^{-1} 4x + C$

Objective: (7.1) Evaluate Integral By Trigonometric Substitution

14) $\frac{1}{10} \tan^{-1} 5x^2 + C$

Objective: (7.1) Evaluate Integral By Trigonometric Substitution

15) $-\frac{6}{4} \cos 2x - \frac{6}{2} x \sin 2x + C$

Objective: (7.2) Evaluate Integral Using Integration by Parts I

Answer Key

Testname: MATH3B_HWCH7_INTEGRATION

$$16) -\frac{1}{6}y^2 \cos 6y + \frac{1}{18}y \sin 6y + \frac{1}{108} \cos 6y + C$$

Objective: (7.2) Evaluate Integral Using Integration by Parts Multiple Times

$$17) \frac{1}{2}x^2e^{2x} - \frac{1}{2}xe^{2x} + \frac{1}{4}e^{2x} + C$$

Objective: (7.2) Evaluate Integral Using Integration by Parts Multiple Times

$$18) \int \cos^n x \, dx = \frac{1}{n} \cos^{n-1} x \sin x + \frac{n-1}{n} \int \cos^{n-2} x \, dx$$

Objective: (7.2) Derive Reduction Formula

$$19) \frac{256 - 177\sqrt{2}}{560}$$

Objective: (7.3) Evaluate Integral (Sine and Cosine)

$$20) 4 \sin 2x - \frac{4}{3} \sin^3 2x + C$$

Objective: (7.3) Evaluate Integral (Sine and Cosine)

$$21) -\frac{1}{14} \cos 7x - \frac{1}{6} \cos 3x + C$$

Objective: (7.3) Evaluate Integral (Sine and Cosine)

$$22) \frac{1}{10} \sin 5t - \frac{1}{18} \sin 9t + C$$

Objective: (7.3) Evaluate Integral (Sine and Cosine)

$$23) \frac{1}{6} \sin 3x + \frac{1}{26} \sin 13x + C$$

Objective: (7.3) Evaluate Integral (Sine and Cosine)

$$24) \frac{1}{2} \sin^6 x - \frac{3}{8} \sin^8 x + C$$

Objective: (7.3) Evaluate Integral (Sine and Cosine)

$$25) -\frac{1}{3} \cos^6 x + \frac{1}{4} \cos^8 x + C$$

Objective: (7.3) Evaluate Integral (Sine and Cosine)

$$26) \frac{15}{4}$$

Objective: (7.3) Evaluate Integral (Tangent/Secant/Cotangent)

$$27) -\frac{2}{3} \csc^3 x + C$$

Objective: (7.3) Evaluate Integral (Tangent/Secant/Cotangent)

$$28) \frac{49}{2} \sin^{-1} \left(\frac{x}{7} \right) + \frac{x\sqrt{49-x^2}}{2} + C$$

Objective: (7.4) Integrate Using Trigonometric Substitution

$$29) \frac{x}{81\sqrt{81+x^2}} + C$$

Objective: (7.4) Integrate Using Trigonometric Substitution

Answer Key

Testname: MATH3B_HWCH7_INTEGRATION

$$30) \frac{1}{25} \frac{\sqrt{x^2 - 25}}{x} + C$$

Objective: (7.4) Integrate Using Trigonometric Substitution

$$31) \frac{1}{2} \tan^{-1} \left(\frac{11}{2} \right) - \frac{1}{2} \tan^{-1} (3)$$

Objective: (7.4) Integrate by Completing the Square

$$32) \frac{1}{3} (x^2 + 9)^{3/2} - 9\sqrt{x^2 + 9} + C$$

Objective: (8.3) Evaluate Integral by Trig Substitution II

$$33) \ln \left| \frac{(x+3)^7}{(x+7)^2} \right| + C$$

Objective: (7.5) Evaluate Integral Using Partial Fractions I

$$34) 3 \ln |x - 5| + 2 \ln |x + 1| + C$$

Objective: (7.5) Evaluate Integral Using Partial Fractions I

$$35) \ln \left| \frac{(x+5)^3(x-1)^2}{(x+3)^3} \right| + C$$

Objective: (7.5) Evaluate Integral Using Partial Fractions I

$$36) 0.475$$

Objective: (7.5) Evaluate Integral Using Partial Fractions I

$$37) 7 \ln |x| + \frac{1}{2} \ln |x^2 + 16| + \frac{1}{4} \tan^{-1} \frac{x}{4} + C$$

Objective: (7.5) Evaluate Integral Using Partial Fractions III

$$38) \frac{8}{3}$$

Objective: (7.5) Evaluate Integral Using Partial Fractions II

$$39) \ln |(x+3)^2(x+2)^3| - \frac{4}{(x+2)} + \frac{1}{(x+2)^2} + C$$

Objective: (7.5) Evaluate Integral Using Partial Fractions II

$$40) \frac{1}{4} \ln |\sin t - 5| - \frac{1}{4} \ln |\sin t - 1| + C$$

Objective: (7.5) Evaluate Integral Using Partial Fractions II

$$41) \frac{x^3}{3} + 25x + \frac{125}{2} \ln |x - 5| - \frac{125}{2} \ln |x + 5| + C$$

Objective: (8.4) Evaluate Integral by Partial Fractions (Improper Fraction)

$$42) 3x + 7 \ln |x| - \frac{5}{x} + 5 \ln |x - 1| + C$$

Objective: (8.4) Evaluate Integral by Partial Fractions (Improper Fraction)

$$43) -\frac{1}{5(\ln x)^5} + C$$

Objective: (7.6) Evaluate Integral

Answer Key

Testname: MATH3B_HWCH7_INTEGRATION

44) $\frac{2}{15}$

Objective: (7.6) Evaluate Integral

45) $-\frac{\sqrt{3x-7}}{x} + \frac{3\sqrt{7}}{7} \tan^{-1} \sqrt{\frac{3x-7}{7}} + C$

Objective: (7.5) Use Table To Evaluate Integral (Radical)

46) $\frac{1}{32} \left(\frac{x}{16-x^2} + \frac{1}{8} \ln \left| \frac{x+4}{x-4} \right| \right) + C$

Objective: (7.5) Use Table To Evaluate Integral (Trig Function/Power)

47) $\frac{e^x}{2} \sqrt{36-e^{2x}} + 18 \sin^{-1} \left(\frac{e^x}{6} \right) + C$

Objective: (7.5) Use Substitution and Integral Table

48) $\frac{e^x}{5} - \frac{4}{25} \ln |5e^x + 4| + C$

Objective: (7.5) Use Substitution and Integral Table

49) $\frac{x}{2} \sqrt{4-x^2} + 2 \sin^{-1} \frac{x}{2} + C$

Objective: (8.5) Use Table To Evaluate Integral (Radical)

50) $\frac{6}{5} \sin 5x - \frac{2}{5} \sin^3 5x + C$

Objective: (8.5) Use Reduction Formula to Evaluate Integral

51) $\frac{33}{2}$

Objective: (8.6) Use the Trapezoidal Rule

52) $\frac{1171}{240}$

Objective: (8.6) Use the Trapezoidal Rule

53) $-\frac{1+\sqrt{2}}{4} \pi$

Objective: (8.6) Use the Trapezoidal Rule

54) 24

Objective: (8.6) Use Simpson's Rule

55) $-\frac{1+2\sqrt{2}}{6} \pi$

Objective: (8.6) Use Simpson's Rule

56) 22

Objective: (8.6) Find Minimum Number of Subintervals

57) 16

Objective: (8.6) Find Minimum Number of Subintervals

58) $\frac{1}{10} \ln 11$

Objective: (8.7) Evaluate Improper Integral (Infinite Limits of Integration) I

Answer Key

Testname: MATH3B_HWCH7_INTEGRATION

59) 18

Objective: (8.7) Evaluate Improper Integral (Infinite Limits of Integration) I

60) 1

Objective: (8.7) Evaluate Improper Integral (Infinite Limits of Integration) II

61) -1.5556

Objective: (7.7) Evaluate Improper Integral (Infinite Limits of Integration) II

62) Divergent

Objective: (7.7) Evaluate Improper Integral (Infinite Limits of Integration) II

63) $\frac{1}{5}$

Objective: (7.7) Find Area Using Improper Integrals

64) $\frac{7}{2}\pi$

Objective: (7.7) Find Area Using Improper Integrals