

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine the integral by making an appropriate substitution.

1) $\int (x^7 - 2x^6)^5 (7x^6 - 12x^5) dx$ 1) _____

A) $\frac{1}{6}(x^7 - 2x^6)^6 + C$ B) $(x^7 - 2x^6)^6 + C$

C) $\frac{1}{5}(x^7 - 2x^6)^5 + C$ D) $7x^6 - 12x^5 + C$

2) $\int \frac{6x^5 dx}{(4 + x^6)^3}$ 2) _____

A) $-\frac{1}{4(4 + x^6)^4} + C$ B) $-\frac{6x^5}{(4 + x^6)^2} + C$

C) $-\frac{1}{2(4 + x^6)^2} + C$ D) $\frac{1}{4}(4 + x^6)^4 + C$

3) $\int x^3 \sqrt{x^4 + 9} dx$ 3) _____

A) $\frac{2}{3}(x^4 + 9)^{3/2} + C$ B) $-\frac{1}{2}(x^4 + 9)^{-1/2} + C$

C) $\frac{8}{3}(x^4 + 9)^{3/2} + C$ D) $\frac{1}{6}(x^4 + 9)^{3/2} + C$

4) $\int 10x^2 \sqrt[4]{7 + 3x^3} dx$ 4) _____

A) $-\frac{20}{3}(7 + 3x^3)^{-3/4} + C$ B) $8(7 + 3x^3)^{5/4} + C$

C) $10(7 + 3x^3)^{5/4} + C$ D) $\frac{8}{9}(7 + 3x^3)^{5/4} + C$

5) $\int x^3 \sqrt{x^4 + 7} dx$ 5) _____

A) $\frac{2}{3}(x^4 + 7)^{3/2} + C$ B) $\frac{1}{8\sqrt{x^4 + 7}} + C$

C) $\frac{1}{6}x^4(x^4 + 7)^{3/2} + C$ D) $\frac{1}{6}(x^4 + 7)^{3/2} + C$

6) $\int \frac{t^2}{\sqrt[5]{8+t^3}} dt$ 6) _____

A) $\frac{5}{18}(8+t^3)^{4/5} + C$

B) $\frac{5}{12}(8+t^3)^{4/5} + C$

C) $\frac{5}{12}t^3(8+t^3)^{4/5} + C$

D) $\frac{1}{12(8+t^3)^4} + C$

7) $\int 4e^{5x} dx$ 7) _____

A) $4e^{5x} + C$

B) $\frac{1}{5}e^{5x} + C$

C) $\frac{4}{5}e^{5x} + C$

D) $\frac{4e^{5x+1}}{5x+1} + C$

8) $\int \frac{x^5}{e^{x^6}} dx$ 8) _____

A) $-\frac{1}{6e^{x^6}} + C$

B) $\frac{1}{e^{x^6}} + C$

C) $\frac{5x^4}{e^{x^6}} + C$

D) $-\frac{1}{6e^{x^6-1}} + C$

9) $\int \frac{e^{1/t^6}}{t^7} dt$ 9) _____

A) $-\frac{e^{1/t^6}}{6t^6} + C$

B) $\frac{e^{-1/t^6}}{6} + C$

C) $-e^{1/t^6} + C$

D) $-\frac{e^{1/t^6}}{6} + C$

10) $\int \frac{(\ln x)^9}{x} dx$ 10) _____

A) $\frac{(\ln x)^{10}}{10x} + C$

B) $(\ln x)^{10} + C$

C) $\frac{(\ln x)^8}{8} + C$

D) $\frac{(\ln x)^{10}}{10} + C$

11) $\int \sin^5 x \cos x dx$ 11) _____

A) $\frac{\sin^6 x}{6} + C$

B) $\frac{\sin^5 x}{6} + C$

C) $\frac{\sin^6 x}{5} + C$

D) $\frac{\sin^5 x}{5} + C$

12) $\int \sin x \cos^7 x dx$ 12) _____

A) $\frac{1}{8} \sin^8 x + C$

B) $-7 \cos^7 x + C$

C) $7 \sin^7 x + C$

D) $-\frac{1}{8} \cos^8 x + C$

13) $\int -9x^3 \sin x^4 \, dx$ 13) _____
 A) $9 \cos x^4 + C$ B) $\frac{9}{4} \cos x^4 + C$ C) $36 \cos x^4 + C$ D) $\frac{9}{4} x^4 \cos x^4 + C$

14) $\int 16x \sqrt[3]{8x^2 - 17} \, dx$ 14) _____
 A) $\frac{(8x^2 - 17)^{4/3}}{3} + C$ B) $\frac{3(8x^2 + 17)^{4/3}}{4} + C$
 C) $\frac{(8x^2 + 17)^4}{32} + C$ D) $\frac{3(8x^2 - 17)^{4/3}}{4} + C$

15) $\int \frac{18x^2 - 5}{(6x^3 - 5x)^2} \, dx$ 15) _____
 A) $\frac{1}{6x^3 - 5x} + C$ B) $-\frac{1}{6x^3 - 5x} + C$
 C) $\frac{(6x^3 - 5x)^3}{3} + C$ D) $\frac{(6x^3 - 5x)^2}{2} + C$

16) $\int 4(2x + 5)^3 \, dx$ 16) _____
 A) $\frac{1}{4}(2x + 5)^4 + C$ B) $\frac{3}{8}(2x + 5)^4 + C$ C) $\frac{1}{2}(2x + 5)^4 + C$ D) $\frac{3}{4}(2x + 5)^4 + C$

17) $\int 3(2x + 5)^3 \, dx$ 17) _____
 A) $\frac{3}{4}(2x + 5)^4 + C$ B) $\frac{1}{4}(2x + 5)^4 + C$ C) $\frac{3}{8}(2x + 5)^4 + C$ D) $\frac{1}{2}(2x + 5)^4 + C$

18) $\int \frac{1}{3\sqrt{x}} \sqrt[5]{6 + \sqrt{x}} \, dx$ 18) _____
 A) $\frac{5(6 + \sqrt{x})^{6/5}}{9} + C$ B) $\frac{5(6 + \sqrt{x})^{6/5}}{18} + C$
 C) $\frac{(6 + \sqrt{x})^6}{9} + C$ D) $\frac{5(6 + \sqrt{x})^{6/5}}{6} + C$

- 19) $\int \frac{x}{(7x^2 + 3)^5} dx$ 19) _____
- A) $-\frac{7}{3(7x^2 + 3)^6} + C$ B) $-\frac{7}{3(7x^2 + 3)^4} + C$
- C) $-\frac{1}{56(7x^2 + 3)^4} + C$ D) $-\frac{1}{14(7x^2 + 3)^6} + C$
- 20) $\int (x - 1)^7 dx$ 20) _____
- A) $\frac{1}{8}(x - 1)^8 + C$ B) $\frac{1}{16(x - 1)^8} + C$
- C) $\frac{1}{2}x^2 + \frac{1}{8}(x - 1)^8 + C$ D) $\frac{1}{9}(x - 1)^9 + \frac{1}{8}(x - 1)^8 + C$
- 21) $\int \frac{2x}{\sqrt{x - 4}} dx$ 21) _____
- A) $\frac{4}{3}(x - 4)^{3/2} + C$ B) $\frac{4}{3}\sqrt{x + 4}(x - 8) + C$
- C) $3(x - 4)^{3/2} + C$ D) $\frac{4}{3}\sqrt{x - 4}(x + 8) + C$
- 22) $\int \tan^2 x \sec^2 x dx$ Use the substitution $u = \tan x$. 22) _____
- A) $\frac{\tan^3 x}{3} + C$
- B) $\frac{\sec^2 x}{2} + C$
- C) $\frac{\tan^2 x}{2} + C$
- D) $\sec x \tan x + C$
- E) none of these
- 23) $\int \frac{\ln 5x}{x} dx$ Use the substitution $u = \ln 5x$. 23) _____
- A) $\frac{1 - \ln 5x}{x^2} + C$
- B) $\frac{1}{2}(\ln 5x)^2 + C$
- C) $\frac{5}{2}(\ln 5x)^2 + C$
- D) $\frac{1}{2}(\ln x)(\ln 5x)^2 + C$
- E) none of these

- 24) $\int \frac{\ln \sqrt{x}}{x} dx$ Use the substitution $u = \ln \sqrt{x}$. 24) _____
- A) $2(\ln \sqrt{x})^2 + C$
 B) $\frac{(\ln x)^2}{4} + C$
 C) $(\ln x)^2 + C$
 D) $\frac{1}{2}(\ln \sqrt{x})^2 + C$
 E) none of these
- 25) $\int (\cos x)^8 \sin x dx$ 25) _____
- A) $-9(\cos x)^9 + C$
 B) $-\frac{1}{9}(\cos x)^9 + C$
 C) $\frac{1}{9}(\cos x)^9 + C$
 D) $9(\cos x)^9 + C$
- 26) $\int 12 \sin x \sqrt{\cos x} dx$ 26) _____
- A) $-18(\cos x)^{3/2} + C$
 B) $-8(\cos x)^{3/2} + C$
 C) $18(\cos x)^{3/2} + C$
 D) $8(\cos x)^{3/2} + C$
- 27) $\int x^2 \sin(7x^3 - 6) dx$ 27) _____
- A) $\frac{1}{21} \cos(7x^3 - 6) + C$
 B) $21 \cos(7x^3 - 6) + C$
 C) $-21 \cos(7x^3 - 6) + C$
 D) $-\frac{1}{21} \cos(7x^3 - 6) + C$
- 28) $\int \frac{e^{1/x}}{x^2} dx$ 28) _____
- A) $-xe^{1/x} + C$
 B) $e^{1/x} + C$
 C) $xe^{1/x} + C$
 D) $-e^{1/x} + C$
 E) none of these

29) $\int \frac{\sin x}{1 - \cos x} dx$ 29) _____

- A) $-\ln|1 - \cos x| + C$
- B) $\frac{1}{2}(1 - \cos x)^2 + C$
- C) $\ln|1 - \cos x| + C$
- D) $\sin x \cos x + C$
- E) none of these

30) $\int \frac{x + \frac{3}{2}}{x^2 + 3x} dx$ 30) _____

- A) $(x^2 + 3x)^{-1} + C$
- B) $\ln|x^2 + 3x| + C$
- C) $(x^2 + 3x)^2 + C$
- D) $\frac{1}{2} \ln|x^2 + 3x| + C$
- E) none of these

31) $\int \frac{\sec^2 x}{(1 - 3 \tan x)^{1/2}} dx$ 31) _____

- A) $-\frac{2}{3}(1 - 3 \tan x)^{1/2} + C$
- B) $(1 - 3 \tan x)^{1/2} + C$
- C) $-\frac{2}{3} \ln|1 - 3 \tan x| + C$
- D) $\ln|1 - 3 \tan x| + C$
- E) none of these

32) $\int \cos^{1/3} x \sin x dx$ 32) _____

- A) $\cos^{4/3} x \sin x + C$
- B) $\cos^{1/3} x + C$
- C) $-\frac{3}{4} \cos^{4/3} x + C$
- D) $\sin^2 x + C$
- E) none of these

33) $\int \frac{\sin \theta \cos^2 \theta}{1 + \cos^3 \theta} d\theta$ 33) _____

A) $\sin^2 \theta \cos^2 \theta + C$

B) $\frac{1}{2}(1 + \cos^3 \theta)^2 + C$

C) $-\frac{1}{3}\ln|1 + \cos^3 \theta| + C$

D) $\frac{1}{2}(\sin \theta \cos^2 \theta)^2 + C$

E) none of these

34) $\int \sqrt{2x^2 - 3x} \left(3x - \frac{9}{4} \right) dx$ 34) _____

A) $(2x^2 - 3x)^2 + C$

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

C) $(2x^2 - 3x)^{3/2} + C$

D) $(2x^2 - 3x)^{1/2} + C$

E) none of these

35) $\int \tan^9(2x) \sec^2(2x) dx$ 35) _____

A) $\frac{1}{20} \tan^{10} x + C$

B) $\tan^{10} x + C$

C) $\frac{1}{10} \tan^{10} x + C$

D) $9 \tan^8 x + C$

E) none of these

36) $\int x^2 \sec^2 x^3 dx$ 36) _____

A) $x^2 \sec x^3 + C$

B) $\frac{1}{3} \tan x^3 + C$

C) $\tan^2 x^3 + C$

D) $\tan x^3 + C$

E) none of these

$$37) \int \frac{e^x}{1 + 2e^x} dx$$

37) _____

A) $(1 + 2e^x)^2 + C$

B) $\ln|1 + 2e^x| + C$

C) $e^{2x} + C$

D) $\frac{1}{2} \ln|1 + 2e^x| + C$

E) none of these

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

$$38) \int x e^{(4 - x^2)} dx$$

38) _____

Enter your answer with any coefficients in front as integers or reduced fractions of form

$$\frac{a}{b}.$$

$$39) \int x \sqrt{x^2 - 16} dx$$

39) _____

Enter your answer with any coefficients in front as integers or reduced fractions of form

$$\frac{a}{b}.$$

$$40) \int (x - 1) e^{(3x^2 - 6x)} dx$$

40) _____

Enter your answer with any coefficients in front as integers or reduced fractions of form

$$\frac{a}{b}.$$

$$41) \int \frac{e^x + x e^x}{4 + x e^x} dx$$

41) _____

Enter your answer with any coefficients in front as integers or reduced fractions of form

$$\frac{a}{b}.$$

$$42) \int x(x^2 - 1)^3 dx$$

42) _____

Enter your answer with any coefficients in front as integers or reduced fractions of form

$$\frac{a}{b}.$$

43) $\int 2x(x^2 + 1)^3 dx$ 43) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

44) $\int 4x^5(x^6 + 100)^5 dx$ 44) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

45) $\int \frac{4x}{\sqrt{x^2 + 2}} dx$ 45) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

46) $\int (3x^2 + 2)\sqrt{x^3 + 2x} dx$ 46) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

47) $\int \frac{(\ln x)^5}{x} dx$ 47) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

48) $\int (x^3 - 3x^2)(6x^2 - 12x) dx$ 48) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

49) $\int \frac{e^x - e^{-x}}{e^x + e^{-x}} dx$ 49) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

50) $\int x e^{x^2} dx$ 50) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

51) $\int x \sqrt{x^2 - 4} dx$ 51) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

52) $\int \frac{\ln x^2}{x} dx$ 52) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

53) $\int x e^{3x^2} dx$ 53) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

54) $\int e^x \sqrt{e^x + 2} dx$ 54) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

55) $\int \frac{x^2 + 2}{\sqrt{x^3 + 6x}} dx$ 55) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

56) $\int x(x^2 + 1)^{17} dx$ 56) _____
 Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

$$57) \int x e^{(x^2 - 2x)} - e^{(x^2 - 2x)} dx \quad 57) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

$$58) \int 5x \sin x^2 dx \quad 58) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

$$59) \int \sin^4 x \cos x dx \quad 59) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

$$60) \int \frac{\sin \sqrt{x}}{\sqrt{x}} dx \quad 60) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

$$61) \int \frac{1}{x \ln x \ln(\ln x)} dx \quad [\text{Hint: Let } u = \ln(\ln x).] \quad 61) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

$$62) \int \frac{\sec^2(\ln x)}{x} dx \quad 62) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

$$63) \int 2 \cos^2 x \sin x dx \quad 63) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

$$64) \int \frac{\cos 2x}{\sin^3 2x} dx \quad 64) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$. No parentheses around arguments of functions.

$$65) \int \tan^4 2x \sec^2 2x dx \quad 65) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$. No parentheses around arguments of functions.

$$66) \int \sin x \sin(\cos x) dx \quad 66) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

$$67) \int \frac{\tan x dx}{\ln(\cos x)} \quad 67) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

$$68) \int \tan x dx \quad 68) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

No parentheses around arguments of functions.

$$69) \int \tan x \ln(\cos x) dx \quad 69) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

$$70) \int \frac{\cos x - \sin x}{\cos x + \sin x} dx \quad 70) \underline{\hspace{2cm}}$$

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

No parentheses around arguments of functions.

71) $\int \cos x \sin^2 x \, dx$ 71) _____

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

No parentheses around arguments of functions.

72) $\int \cos x e^{\sin x} \, dx$ 72) _____

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

No parentheses around arguments of functions.

73) $\int e^{2x} \cos(e^{2x}) \, dx$ 73) _____

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

74) $\int \frac{\sin x e^{(x + \cos x)}}{e^x} \, dx$ 74) _____

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

No parentheses around arguments of functions.

75) $\int \cot x \csc x e^{\csc x} \, dx$ [Hint: $\frac{d}{dx} \csc x = -\cot x \csc x$] 75) _____

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

No parentheses around arguments of functions.

76) $\int \cos^3 x \, dx$ [Hint: $\cos^2 x = 1 - \sin^2 x$.] 76) _____

Enter your answer with any coefficients in front as integers or reduced fractions of form $\frac{a}{b}$.

No parentheses around arguments of functions.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

77) Which of the following is a correct substitution for the integral $\int_1^e \frac{\cos(\ln x)}{x} dx$? 77) _____

A) $u = \ln x; \int_0^1 \sin u \, du$

B) $u = \frac{\ln x}{x}; \int_1^e \cos u \, du$

C) $u = \ln x; \int_0^1 \frac{\cos u}{u} \, du$

D) $u = \ln x; \int_1^e \cos u \, du$

E) $u = \ln x; \int_0^1 \cos u \, du$

Evaluate the integral using integration by parts.

78) $\int 4xe^x \, dx$ 78) _____
 A) $4e^x - 4xe^x + C$ B) $4xe^x - 4e^x + C$ C) $4e^x - e^x + C$ D) $xe^x - 4e^x + C$

79) $\int 5x \ln x \, dx$ 79) _____
 A) $\frac{5}{2}x \ln x - \frac{5}{4}x + C$ B) $\frac{5}{2}x^2 \ln x - \frac{5}{4}x^2 + C$
 C) $\frac{x^2}{2} \ln x - \frac{x^2}{4} + C$ D) $\frac{5}{2}x^2 \ln x - \frac{x^2}{4} + C$

80) $\int \ln 4x \, dx$ 80) _____
 A) $4x \ln x - x + C$ B) $x \ln 4x + x + C$
 C) $x \ln 4x - 4x + C$ D) $x \ln 4x - x + C$

81) $\int x^4 \ln 3x \, dx$ 81) _____
 A) $\ln 3x - \frac{1}{5}x^5 + C$ B) $\frac{1}{5}x^5 \ln 3x - \frac{1}{30}x^6 + C$
 C) $\frac{1}{5}x^5 \ln 3x - \frac{1}{25}x^5 + C$ D) $\frac{1}{5}x^5 \ln 3x + \frac{1}{25}x^5 + C$

82) $\int \frac{\ln 5x}{x^8} dx$ 82) _____

A) $-\frac{1}{7} x^{-7} \ln 5x + \frac{1}{49} x^{-7} + C$

B) $-\frac{1}{7} x^{-7} \ln 5x - \frac{1}{49} x^{-7} + C$

C) $\ln 5x + \frac{1}{7} x^{-7} + C$

D) $-\frac{1}{7} x^{-7} \ln 5x - \frac{1}{42} x^{-6} + C$

83) $\int x\sqrt{9-x} dx$ 83) _____

A) $-\frac{2}{3}x(9-x)^{3/2} - \frac{2}{5}(9-x)^{5/2} + C$

B) $\frac{2}{3}x(9-x)^{3/2} + \frac{4}{15}(9-x)^{5/2} + C$

C) $-\frac{2}{3}x(9-x)^{3/2} + \frac{4}{15}(9-x)^{5/2} + C$

D) $-\frac{2}{3}x(9-x)^{3/2} - \frac{4}{15}(9-x)^{5/2} + C$

84) $\int (x-2)e^{2x} dx$ 84) _____

A) $2(x-2)e^{2x} - 4e^{2x} + C$

B) $\frac{1}{2}(x-2)e^{2x} - \frac{1}{4}e^{2x} + C$

C) $(x-2)e^{2x} - e^{2x} + C$

D) $\frac{1}{2}(x-2)e^{2x} + \frac{1}{4}e^{2x} + C$

85) $\int (7x+2)e^{-5x} dx$ 85) _____

A) $\frac{7}{5}xe^{-5x} + \frac{17}{25}e^{-5x} + C$

B) $-35xe^{-5x} - 185e^{-5x} + C$

C) $-\frac{7}{5}xe^{-5x} - e^{-5x} + C$

D) $-\frac{7}{5}xe^{-5x} - \frac{17}{25}e^{-5x} + C$

86) $\int -3x \cos 9x dx$ 86) _____

A) $-\frac{1}{3} \cos 9x - 3x \sin 9x + C$

B) $-\frac{1}{27} \cos 9x - \frac{1}{3}x \sin 3x + C$

C) $-\frac{1}{27} \cos 9x - \frac{1}{3}x \sin 9x + C$

D) $-\frac{1}{27} \cos 9x - \frac{1}{3} \sin 9x + C$

87) $\int 15x \sin x dx$ 87) _____

A) $15 \sin x - 15 \cos x + C$

B) $15 \sin x - x \cos x + C$

C) $15 \sin x + 15x \cos x + C$

D) $15 \sin x - 15x \cos x + C$

88) $\int x e^{3x} dx$ 88) _____

A) $\frac{1}{3}e^{3x} + C$

B) $e^{3x} \left(\frac{1}{3}x - \frac{1}{9} \right) + C$

C) $\frac{1}{6}x^2 e^{3x} + C$

D) $e^{3x} \left(\frac{1}{3}x - 1 \right) + C$

89) $\int x e^{8x} dx$ 89) _____

A) $x e^{8x} + C$

B) $e^{8x} \left(x - \frac{1}{8} \right) + C$

C) $e^{8x}(8x - 1) + C$

D) $e^{8x} \left(\frac{1}{8}x - \frac{1}{64} \right) + C$

90) $\int x^4 \ln x dx$ 90) _____

A) $x^5 \left(5 \ln x - \frac{1}{25} \right) + C$

B) $x^5 \left(\frac{1}{5} \ln x - \frac{1}{5} \right) + C$

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

D) $x^5 \left(\frac{1}{5} \ln x - \frac{1}{25} \right) + C$

91) $\int \ln 2x dx$ 91) _____

A) $x(\ln |2x| - 2) + C$

B) $x(\ln |2x| + 2) + C$

C) $x(\ln |2x| - 1) + C$

D) $x(\ln |2x| + 1) + C$

92) $\int (x + 1)e^x dx$ 92) _____

A) $(x + 1)e^x + C$

B) $(x + 2)e^x + C$

C) $x e^x + C$

D) $x e^{x+1} + C$

93) $\int x^2 e^{2x} dx$ 93) _____

A) $e^{2x} \left(\frac{x^2 - x}{2} \right) + 1 + C$

B) $e^{2x} \left(\frac{x^2 - 2x}{2} \right) + C$

C) $e^{2x} \left(\frac{x^2 - 4x}{2} \right) + C$

D) $e^{2x} \left(\frac{2x^2 - 2x + 1}{4} \right) + C$

- 94) $\int x e^{3x} dx$ 94) _____
- A) $\frac{x^2 e^{3x}}{6} + C$
- B) $\frac{e^{3x}}{3} + C$
- C) $\frac{x e^{3x} - e^{3x}}{3} + C$
- D) $\frac{3x e^{3x} - e^{3x}}{9} + C$
- E) none of these
-
- 95) $\int \sin^{-1} x dx$ 95) _____
- A) $\sin^{-1} x + \sqrt{1 - x^2} + C$
- B) $\sin^{-1} x - \sqrt{1 - x^2} + C$
- C) $x + \sqrt{1 - x^2} + C$
- D) $x \sin^{-1} x + \sqrt{1 - x^2} + C$
-
- 96) $\int x e^{-x} dx$ 96) _____
- A) $-x e^{-x} + e^{-x} + C$
- B) $x e^{-x} - e^{-x} + C$
- C) $x e^{-x} + e^{-x} + C$
- D) $-x e^{-x} - e^{-x} + C$
-
- 97) $\int x^2 e^{-x} dx$ 97) _____
- A) $-(x^2 + 2x + 2)e^{-x} + C$
- B) $-(2x + 2)e^{-x} + C$
- C) $(x^2 + 2x + 2)e^{-x} + C$
- D) $(x^2 + 2x)e^{-x} + C$
-
- 98) $\int x \sqrt{x+1} dx$ 98) _____
- A) $x(x+1)^{3/2} - (x+1)^{5/2} + C$
- B) $(x+1)^{3/2} + (x+1)^{5/2} + C$
- C) $\frac{2}{3}x(x+1)^{3/2} - \frac{4}{15}(x+1)^{5/2} + C$
- D) $\frac{2}{3}(x+1)^{3/2} - \frac{4}{15}(x+1)^{5/2} + C$
-
- 99) $\int e^{ax} \cos bx dx$ 99) _____
- A) $\frac{1}{2b} e^{ax} \cos^2 bx + C$
- B) $e^{ax} \left(\frac{b \sin bx + a \cos bx}{a^2 + b^2} \right) + C$
- C) $e^{ax} (\sin bx + \cos bx) + C$
- D) $e^{ax} (\sin bx - \cos bx) + C$

100) $\int e^{ax} \sin bx \, dx$ 100) _____

A) $e^{ax}(\sin bx - \cos bx) + C$ B) $\frac{1}{2b}e^{ax} \cos^2 bx + C$

C) $e^{ax}(\sin bx + \cos bx) + C$ D) $e^{ax} \left(\frac{a \sin bx - b \cos bx}{a^2 + b^2} \right) + C$

101) $\int e^{2x} \sin 3x \, dx$ 101) _____

A) $e^{2x}(\sin 3x - \cos 3x) + C$ B) $\frac{1}{13}e^{2x}(2 \sin 3x - 3 \cos 3x) + C$

C) $-e^{2x}(\sin 3x - 3 \cos 3x) + C$ D) $\frac{1}{13}e^{2x}(\sin 3x - 3 \cos 3x) + C$

102) $\int \sec^4 x \, dx$ 102) _____

A) $4 \sec^3 x \tan x + C$ B) $\sec^2 x \tan x + \tan x + C$

C) $\frac{1}{5} \sec^5 x \tan x + C$ D) $\frac{1}{3} \sec^2 x \tan x + \frac{2}{3} \tan x + C$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

103) Does this integral $\int 2xe^x \, dx = 2e^x(x - 1) + C$? 103) _____

Enter "yes" or "no".

104) Does this integral $\int t^3 \cos t \, dt = (t^3 - 6t) \sin t + 3(t^2 - 2) \cos t + C$? 104) _____

Enter "yes" or "no".

105) Does this integral $\int \frac{\ln(2x)}{x^2} \, dx = -\frac{1 + \ln 2 + \ln x}{x} + C$? 105) _____

Enter "yes" or "no".

106) Does this integral $\int 3x\sqrt{4x+3} \, dx = \frac{3(2x-1)(4x+3)^{3/2}}{20} + C$? 106) _____

Enter "yes" or "no".

107) Does this integral $\int x^2 \sin 2x \, dx = \frac{(1 - 2x^2)\cos 2x}{4} + \frac{x \sin 2x}{2} + C$? 107) _____

Enter "yes" or "no".

- 108) Does this integral $\int x e^x \sin x \, dx = \frac{-e^x((x-1)\cos x + x \sin x)}{2} + C$? 108) _____
Enter "yes" or "no".
- 109) Does this integral $\int x \sin 10x \, dx = \frac{1}{100} \sin 10x - \frac{x}{10} \cos 10x + C$? 109) _____
Enter "yes" or "no".
- 110) Does this integral $\int x \cos 5x \, dx = \frac{1}{5} x \sin 5x - \frac{1}{25} \cos 5x + C$? 110) _____
Enter "yes" or "no".
- 111) Does this integral $\int x^3 \ln x \, dx = \frac{1}{4} x^4 \ln x + \frac{1}{16} x^4 + C$? 111) _____
Enter "yes" or "no".
- 112) Does this integral $\int x e^{-3x} \, dx = -\frac{1}{3} x e^{-3x} - \frac{1}{9} e^{-3x} + C$? 112) _____
Enter "yes" or "no".
- 113) Does this integral $\int x \sec^2 x \, dx = x \tan x + \ln|\cos x| + C$? 113) _____
Enter "yes" or "no".
- 114) Does this integral $\int \frac{\cos x}{(3 \sin x + 1)^2} \, dx = \frac{1}{3(3 \sin x + 1)} + C$? 114) _____
Enter "yes" or "no".
- 115) Does this integral $\int x^2 e^x \, dx = x^2 e^x - 2(x e^x - e^x) + C$? 115) _____
Enter "yes" or "no".
- 116) Does this integral $\int \ln x \, dx = x \ln x + x + C$? 116) _____
Enter "yes" or "no".
- 117) Does this integral $\int e^x \cos x \, dx = \frac{e^x \sin x + e^x \cos x}{2} + C$? 117) _____
Enter "yes" or "no".
- 118) Does this integral $\int 3x \cos x \, dx = 3x \sin x + 3 \cos x + C$? 118) _____
Enter "yes" or "no".

- 119) Does this integral $\int \sin(\ln x) dx = \frac{x \sin(\ln x) - x \cos(\ln x)}{2}$? 119) _____
Enter "yes" or "no".
- 120) Does this integral $\int \frac{x e^{-x}}{(x-1)^2} dx = \frac{e^{-x}}{1-x} + C$? 120) _____
Enter "yes" or "no".
- 121) Does this integral $\int x\sqrt{x+3} dx = \frac{2}{3}x(x+3)^{3/2} - \frac{4}{15}(x+3)^{5/2} + C$? 121) _____
Enter "yes" or "no".
- 122) Does this integral $\int (x^2 + x)e^x dx = e^x(x^2 + x - 1) + C$? 122) _____
Enter "yes" or "no".
- 123) Does this integral $\int x(x+2)^{2/3} dx + \frac{3}{40}(2+x)^{5/3}(5x-6) + C$? 123) _____
Enter "yes" or "no".
- 124) Does this integral $\int x \ln x dx = \frac{x^2}{2} \ln x - \frac{x^2}{4} + C$? 124) _____
Enter "yes" or "no".
- 125) Does this integral $\int x \cos x dx = x \sin x + \cos x + C$? 125) _____
Enter "yes" or "no".
- 126) Does this integral $\int \sin x \sec^2 x dx = \sin x \tan x + \cos x + C$? 126) _____
Enter "yes" or "no".
- 127) Does this integral $\int (x+2) \sin 2x dx = \frac{1}{4} \sin 2x - \frac{(x+2)}{2} \cos 2x$? 127) _____
Enter "yes" or "no".
- 128) Does this integral $\int \frac{\ln(\ln x)}{x} dx = \ln x (\ln(\ln x) - 1) + C$? 128) _____
Enter "yes" or "no".
- 129) Does this integral $\int \frac{x+1}{e^{2x}} dx = \frac{-e^{2x}}{4}(2x+3) + C$? 129) _____
Enter "yes" or "no".

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

130) Which of the following accurately describes integration by parts?

130) _____

A) $\int f(x)g(x) dx = f'(x)g(x) - \int f(x)g'(x) dx$

B) $\int f(x)g(x) dx = f'(x)g'(x) - \int f'(x)g'(x) dx$

C) $\int f(x)g'(x) dx = f'(x)g(x) - \int f'(x)g(x) dx$

D) $\int f(x)g'(x) dx = f(x)g(x) - \int f'(x)g(x) dx$

E) none of these

131) Decide whether integration by parts or substitution should be used to compute the indefinite integral

131) _____

$$\int \ln 4x dx$$

If substitution, indicate the value of u ; if by parts, indicate $f(x)$ and $g(x)$.

A) substitution; $u = 4x$

B) integration by parts; $f(x) = \ln x$, $g(x) = 4x$

C) integration by parts; $f(x) = 1$, $g(x) = \ln 4x$

D) integration by parts; $f(x) = \ln 4x$, $g(x) = 1$

E) none of these

132) Decide whether integration by parts or substitution should be used to compute the indefinite integral

132) _____

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

If substitution, indicate the value of u ; if by parts, indicate $f(x)$ and $g(x)$.

A) integration by parts; $f(x) = 1$, $g(x) = \frac{\cos(\ln x)}{x}$

B) substitution; $u = \frac{\ln x}{x}$

C) integration by parts; $f(x) = \cos(\ln x)$, $g(x) = \frac{1}{x}$

D) substitution; $u = \ln x$

E) none of these

133) Decide whether integration by parts or substitution should be used to compute the indefinite integral

133) _____

$$\int \frac{-e^{1/x}}{x^2} dx$$

If substitution, indicate the value of u ; if by parts, indicate $f(x)$ and $g(x)$.

A) integration by parts; $f(x) = -e^{1/x}$, $g(x) = \frac{1}{x^2}$

B) substitution; $u = \frac{1}{x}$

C) substitution; $u = x^{-2}$

D) integration by parts; $f(x) = -\frac{1}{x^2}$, $g(x) = e^{1/x}$

E) none of these

Evaluate the integral.

134) $\int_0^1 \frac{x^2}{(5+2x^3)^2} dx$

134) _____

A) 2

B) $\frac{1}{105}$

C) $\frac{12}{35}$

D) $\frac{109}{9}$

135) $\int_2^5 3t dt$

135) _____

A) $\frac{87}{2}$

B) $\frac{75}{2}$

C) $\frac{63}{2}$

D) $\frac{1827}{4}$

136) $\int_0^2 \frac{36x}{(6x^2+5)^2} dx$

136) _____

A) $\frac{8}{145}$

B) $\frac{42}{145}$

C) $\frac{72}{145}$

D) $\frac{8088}{88,410,125}$

137) $\int_0^1 4x^3\sqrt{x^4+25} dx$

137) _____

A) $2\sqrt{26} - 10$

B) $\frac{52\sqrt{26} - 250}{12}$

C) $\frac{52\sqrt{26} - 250}{3}$

D) $\frac{52\sqrt{26} + 250}{3}$

138) $\int_0^4 xe^x dx$

138) _____

A) $3e^4 - 1$

B) $3e^4 + 1$

C) $5e^4 + 1$

D) $3e^4$

- 139) $\int_0^6 x e^{-x} dx$ 139) _____
 A) $-7e^{-6}$ B) $-5e^{-6} + 1$ C) $-7e^{-6} - 1$ D) $-7e^{-6} + 1$
- 140) $\int_{-2}^1 \frac{x}{\sqrt{x+3}} dx$ 140) _____
 A) $\frac{4}{3}$ B) $-\frac{4}{3}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$
- 141) $\int_1^2 -\frac{e^{1/x}}{x^2} dx$ 141) _____
 A) $e^{1/2} - e$ B) $e - e^2$ C) e D) $e^{1/2}$
- 142) $\int_0^\pi \sin x \cos x dx$ 142) _____
 A) 1 B) 0 C) π D) -1
- 143) $\int_1^2 \ln x dx$ 143) _____
 A) $-\ln 2$ B) $2 \ln 2 - 1$ C) $\ln 2$ D) $\ln 2 + 1$
- 144) $\int_1^2 x \ln x dx$ 144) _____
 A) $2 \ln 2$ B) $\frac{3}{4} + \ln 2$ C) $2 \ln 2 - 3/4$ D) $\ln 2 - \frac{1}{2}$
- 145) $\int_0^{\pi/2} x \cos x dx$ 145) _____
 A) $\frac{\pi}{2} - 1$ B) 1 C) 0 D) $\pi/2$
- 146) $\int_1^4 \frac{1}{2x+1} dx$ 146) _____
 A) $\frac{\ln 3}{2}$ B) $\ln 4$ C) $1 + \ln 2$ D) $-\ln 2$

147) $\int_0^1 x e^{x^2} dx$

147) _____

- A) $\frac{e}{2}$
- B) 1
- C) $e - 1$
- D) e
- E) none of these

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

148) $\int_2^3 \frac{x}{(x^2 - 2)^2} dx$

148) _____

Enter just a reduced fraction of form $\frac{a}{b}$.

149) $\int_1^3 \frac{1}{x} dx$

149) _____

Enter just a real number (no approximations and no parentheses around the argument).

150) Does this integral $\int_0^1 \frac{2x^3}{(x^2 + 4)^2} dx = \ln 5 - 2 \ln 2 - \frac{1}{5}$?

150) _____

Enter "yes" or "no".

151) Does this integral $\int_0^1 \frac{2x + 1}{e^x} dx = \frac{3e - 5}{e}$?

151) _____

Enter "yes" or "no".

152) Does this integral $\int_1^{\sqrt{e}} \frac{\cos(\ln x^2)}{x} dx = \frac{1}{2} \sin(1)$?

152) _____

Enter "yes" or "no".

153) Does this integral $\int_0^1 x e^{3x^2} dx = \frac{1}{6}(e^3 - 1)$?

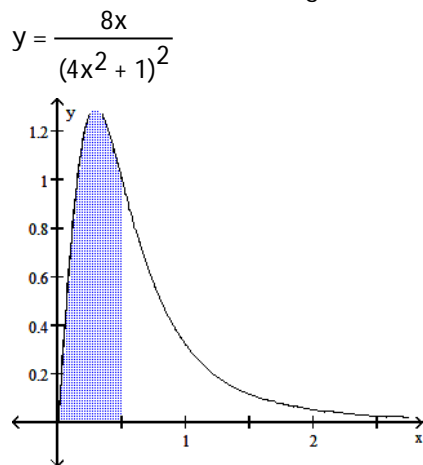
153) _____

Enter "yes" or "no".

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

154) Find the area of the shaded region.

154) _____



A) $\frac{1}{2}$ square units

B) 2 square units

C) $\frac{3}{2}$ square units

D) - 1 square units

Divide the given interval into n subintervals and list the value of Δx and the endpoints a_0, a_1, \dots, a_n of the subintervals.

155) $-5 \leq x \leq 2; n = 5$

155) _____

A) $\Delta x = 1.4; a_0 = -5, a_1 = -4.3, a_2 = -2.2, a_3 = -0.8, a_4 = 1.3, a_5 = 2$

B) $\Delta x = 0.4; a_0 = -5, a_1 = -4.3, a_2 = -2.9, a_3 = -0.8, a_4 = 0.6, a_5 = 2$

C) $\Delta x = 1.75; a_0 = -5, a_1 = -3.25, a_2 = -1.5, a_3 = 0.25, a_4 = 2$

D) $\Delta x = 1.4; a_0 = -5, a_1 = -3.6, a_2 = -2.2, a_3 = -0.8, a_4 = 0.6, a_5 = 2$

Divide the interval into n subintervals and list the value of Δx and the midpoints x_1, \dots, x_n of the subintervals.

156) $-1 \leq x \leq 2; n = 6$

156) _____

A) $\Delta x = 0.5; x_1 = -0.75, x_2 = -0.25, x_3 = 0.25, x_4 = 0.75, x_5 = 1.25, x_6 = 1.75$

B) $\Delta x = 0.25; x_1 = -0.75, x_2 = -0.25, x_3 = 0.25, x_4 = 0.75, x_5 = 1.25, x_6 = 1.75$

C) $\Delta x = 0.5; x_1 = -0.5, x_2 = 0, x_3 = 0.5, x_4 = 1, x_5 = 1.5, x_6 = 2$

D) $\Delta x = 0.5; x_1 = -0.5, x_2 = -0.25, x_3 = 0.25, x_4 = 0.75, x_5 = 1.25, x_6 = 2$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Approximate the integral by the midpoint rule.

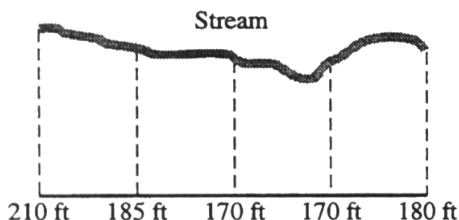
157) Approximate $\int_1^3 \frac{1}{x} dx$; $n = 4$

157) _____

Enter just a real number rounded to two decimal places.

- 158) A homeowner has fences on three sides of her property and a stream runs along the fourth side. She makes measurements of the distance to the stream every 10 feet as illustrated. What is the approximate area of her property?

158) _____



Enter just an integer (no units).

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Approximate the integral by the trapezoidal rule.

159) $\int_0^1 x^3 e^x dx$; $n = 4$

159) _____

Express your answer to four decimal places.

A) 4.9568

B) 0.9593

C) 1.2392

D) 0.6196

160) $\int_2^4 (\ln x)^2 dx$; $n = 4$

160) _____

Express your answer to five decimal places.

A) 2.40854

B) 9.63417

C) 1.50455

D) 4.81709

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

161) $\int_1^3 \frac{1}{x} dx$; $n = 4$

161) _____

Enter just a real number rounded to two decimal places.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 162) The following data give the marginal cost for different levels of production at Zipperty-Doo-Dah Inc. Here x represents the number of zippers produced and $C'(x)$ is in dollars per zipper. Approximate the total in going from a production level of 40 zippers to 80 zippers. 162) _____

x	40	50	60	70	80
$C'(x)$	2.5	3.0	3.3	3.8	4.5

- A) \$85.50 B) \$272.00 C) \$136.00 D) \$27.20

Use $n = 4$ to approximate the value of the integral by the trapezoidal rule.

- 163) $\int_1^3 \frac{4}{x^2} dx$ 163) _____
- A) $\frac{141}{25}$ B) $\frac{71}{25}$ C) $\frac{141}{100}$ D) $\frac{141}{50}$

- 164) $\int_0^1 \frac{9}{1+x} dx$ 164) _____
- A) $\frac{2229}{280}$ B) $\frac{3513}{280}$ C) $\frac{1747}{560}$ D) $\frac{3513}{560}$

Solve the problem. Round your answer, if appropriate.

- 165) Suppose that the accompanying table shows the velocity of a car every second for 8 seconds. Use the trapezoidal rule to approximate the distance traveled by the car in the 8 seconds. 165) _____

Time (sec)	Velocity (ft/sec)
0	16
1	17
2	18
3	20
4	19
5	21
6	18
7	16
8	17

- A) 291 feet B) 221.5 feet C) 145.5 feet D) 162 feet

- 166) The following table shows the rate of water flow (in gal/min) from a stream into a pond during a 30-minute period after a thunderstorm. Use the trapezoidal rule to estimate the total amount of water flowing into the pond during this period.

166) _____

Time (min)	Rate (gal/min)
0	300
5	350
10	400
15	350
20	320
25	300
30	250

- A) 9050.0 gallons B) 9975 gallons C) 11,350 gallons D) 9983.3 gallons

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Approximate the integral by the Simpson's rule.

167) $\int_1^3 \frac{1}{x} dx$; $n = 4$

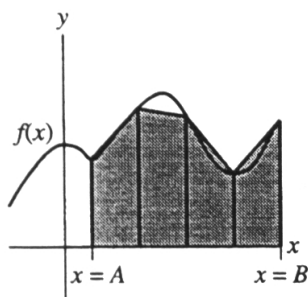
167) _____

Enter just a real number rounded to two decimal places.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 168) The shaded area in the diagram represents an estimation $\int_a^b f(x) dx$ using:

168) _____



- A) Simpson's rule with $n = 4$
 B) the midpoint rule with $n = 4$
 C) the trapezoid rule with $n = 4$
 D) a Riemann Sum using left endpoints
 E) a Riemann Sum using right endpoints

169) Which of the following statements are true?

169) _____

- A) The error in the trapezoid rule decreases as the number of subintervals increases.
- B) In general, the error from the midpoint rule is less than the error from the trapezoid rule.
- C) In general, Simpson's rule is more accurate than the midpoint rule.
- D) In general, the trapezoid rule is more accurate than the midpoint rule.
- E) All of these statements are true.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

170) Approximate $\int_0^4 2x \, dx$; $n = 4$, by (a) the trapezoidal rule, (b) the midpoint rule, and (c) 170) _____

then find the exact value of the integral.

Enter just three integers separated by commas answering (a), (b), (c) in that order but unlabeled.

171) Approximate $\int_0^3 x^2 \, dx$; $n = 4$, by (a) the trapezoidal rule, (b) the midpoint rule, and (c) 171) _____

then find the exact value of the integral.

Enter just a, b, c where a and b are real numbers to two decimal places (rounded off), and c is an integer, all separated by commas and answering (a), (b), (c) in order but unlabeled.

172) Approximate $\int_0^4 \sqrt{x} \, dx$; $n = 2$, by (a) the trapezoidal rule, (b) the midpoint rule, and (c) 172) _____

then find the exact value of the integral.

Enter just a, b, c where a, b are real numbers rounded to two decimal places, and c is a reduced fraction of form $\frac{a}{b}$ all unlabeled and answering the questions in order, separated by commas.

173) Approximate $\int_1^5 \frac{1}{2x^2} \, dx$; $n = 8$, by (a) the trapezoidal rule, (b) the midpoint rule, and (c) 173) _____

then find the exact value of the integral.

Enter just a, b, c as real numbers all rounded to two decimal places. Do not label, but answer in the above order using commas to separate.

174) Approximate $\int_0^4 \frac{1}{x^2 + 1} \, dx$; $n = 2$, by (a) the midpoint rule, (b) the trapezoidal rule, and 174) _____

(c) Simpson's rule.

Enter your answers in that order as just unlabeled real numbers rounded to two decimal places, separated by commas.

175) Approximate $\int_1^3 \frac{1}{x} dx$; $n = 10$, by (a) Simpson's rule and (b) the trapezoidal rule. 175) _____

Enter your answers in that order as just unlabeled real numbers rounded to two decimal places, separated by commas.

176) Approximate $\int_0^1 \frac{1}{1+x^2} dx$; $n = 4$, by (a) Simpson's rule and (b) the trapezoidal rule. 176) _____

Enter your answers in that order as just unlabeled real numbers rounded to two decimal places, separated by a comma.

177) Approximate $\int_0^1 \sqrt{1+x^3} dx$; $n = 4$, by (a) Simpson's rule and (b) the trapezoidal rule. 177) _____

Enter your answers in that order as just unlabeled real numbers rounded to two decimal places, separated by a comma.

178) Approximate $\int_1^2 \frac{1}{x^2} dx$; $n = 6$, by (a) Simpson's rule and (b) the trapezoidal rule. 178) _____

Enter your answers in that order as just unlabeled real numbers rounded to two decimal places, separated by a comma.

179) Approximate $\int_0^1 x^3 dx$; $n = 4$, by (a) Simpson's rule and (b) the trapezoidal rule. 179) _____

Enter your answers in that order as just unlabeled real numbers rounded to two decimal places, separated by a comma.

180) Approximate $\int_0^1 x^4 dx$; $n = 4$, by (a) Simpson's rule and (b) the trapezoidal rule. 180) _____

Enter your answers in that order as just unlabeled real numbers rounded to two decimal places, separated by a comma.

181) Approximate $\int_0^1 x^4 dx$; $n = 6$, by (a) Simpson's rule and (b) the trapezoidal rule. 181) _____

Enter your answers in that order as just unlabeled real numbers rounded to two decimal places, separated by a comma.

182) Calculate (a) the trapezoidal approximation and (b) Simpson's approximation to

182) _____

$$\int_a^b f(x) dx \text{ where } f \text{ is the tabulated function.}$$

x	a= 1.0	1.33	1.67	2.0	2.33	2.67	3.0 = b
f(x)	5.2	6.9	1.4	0.06	2.3	0.01	1.5

Enter your answers in that order as just unlabeled real numbers rounded off to two decimal places, separated by a comma.

183) Calculate (a) the trapezoidal approximation and (b) Simpson's approximation to

183) _____

$$\int_a^b f(x) dx \text{ where } f \text{ is the tabulated function.}$$

x	a= 0	1	2	3	4	5	6	7	8	9	10 = b
f(x)	1	2	3	4	5	6	7	8	9	10	11

Enter your answers in that order as just unlabeled integers separated by a comma.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use $n = 4$ to approximate the value of the integral by Simpson's rule.

184) $\int_1^5 5x \sqrt{2x - 1} dx$

184) _____

A) 142.7

B) 131.5

C) 140.7

D) 28.5

Solve the problem. Round your answer, if appropriate.

185) Suppose that the accompanying table shows the velocity of a car every second for 8 seconds. Use Simpson's rule to approximate the distance traveled by the car in the 8 seconds.

185) _____

Time (sec)	Velocity (ft/sec)
0	20
1	21
2	22
3	24
4	23
5	25
6	22
7	20
8	21

A) 178.33 feet

B) 176.33 feet

C) 177.50 feet

D) 132.00 feet

- 186) The following table shows the rate of water flow (in gal/min) from a stream into a pond during a 30-minute period after a thunderstorm. Use Simpson's rule to estimate the total amount of water flowing into the pond during this period.

186) _____

Time (min)	Rate (gal/min)
0	300
5	350
10	400
15	350
20	320
25	300
30	250

- A) 9983.3 gallons B) 9975 gallons C) 9050.0 gallons D) 11,475 gallons

Solve the problem.

- 187) Consider $\int_0^2 f(x)dx$, where $f(x) = \frac{1}{20}x^5 + 3x^2$. Find a number A such that $|f''(x)| \leq A$ for all x satisfying $0 \leq x \leq 2$. Use this A to obtain a bound on the error of using the midpoint rule with $n = 4$ to approximate the definite integral.

187) _____

- A) 0.2917 B) 0.1250 C) 1.4583 D) 0.0365

- 188) Consider $\int_0^{1/3} f(x)dx$, where $f(x) = e^{-3x}$. Find a number A such that $|f'''(x)| \leq A$ for all x satisfying $0 \leq x \leq \frac{1}{3}$. Use this A to obtain a bound on the error of using Simpson's rule with $n = 2$ to approximate the definite integral.

188) _____

- A) 2.8935×10^{-5} B) 1.0417×10^{-2} C) 7.2338×10^{-6} D) 6.5104×10^{-5}

- 189) Suppose the annual rate of income from an investment at any time t is $K(t) = -100 + 50t$. What is the formula for the present value of the income over the next 5 years at a 6% interest rate compounded continuously?

189) _____

- A) $\int_1^5 50t^{-0.06t} dt$
 B) $\int_1^5 (50t - 100)e^{-0.06t} dt$
 C) $\int_0^5 (50t - 100)e^{-0.06t} dt$
 D) $\int_0^5 (50t - 100)e^{0.06t} dt$
 E) none of these

- 190) If the annual rate of return from an investment is $-3000 + 125t$, find the present value of the income generated in the third year if the interest rates are 8.5%.

190) _____

- A) $\int_0^3 (-3000 + 125t)e^{-0.085t} dt$
 B) $\int_0^3 (125t - 3000)e^{0.085t} dt$
 C) $\int_2^3 (-3000 + 125t)e^{-0.085t} dt$
 D) $\int_2^3 (125t - 3000)e^{0.085t} dt$
 E) none of these

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 191) A company estimates that the rate of revenue produced by an investment will be $K(t)$ thousand dollars per year at time t , where $K(t) = 9te^{-0.2t}$. Find the present value of this stream of income over the next four years using 10% interest rate.
 Enter just an integer (no units) representing the amount to the nearest dollar.

191) _____

- 192) A large conglomerate estimates that a new plant will yield an annual rate of return of $5000 - 250t$ thousand dollars. If the interest rate is 9%, what is the present value of the income generated in the first three years of the plant's operation?
 Enter just an integer (no units) representing the amount to the nearest dollar.

192) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

- 193) An investment is expected to produce a uniform continuous rate of money flow of \$500 per year for 10 years. Find the present value at 5% compounded continuously.

193) _____

- A) \$16,065.31 B) \$3934.69 C) \$6065.31 D) \$6487.21

- 194) The rate of a continuous money flow is $500e^{0.04}$ dollars per year for 10 years. Find the present value if interest is earned at 7% compounded continuously.

194) _____

- A) \$5830.98 B) \$4319.70 C) \$29,013.64 D) \$22,497.65

- 195) The rate of a continuous money flow is $1000e^{-.4}$ dollars per year for 10 years. Find the present value if interest is earned at 5% compounded continuously.

195) _____

- A) \$27,328.92 B) \$6593.67 C) \$16,217.81 D) \$15,628.55

- 196) A money market fund has a continuous flow of money at a rate of $0.01x + 900$ dollars for 10 years. Find the present value of this flow if interest is earned at 6% compounded continuously. 196) _____
- A) \$6768.16 B) \$5206.28 C) \$5640.14 D) \$23,237.39

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 197) In 1940, the population density of Philadelphia was given by $60e^{-0.4t}$ thousand people per square mile at a distance t miles from City Hall. How many people lived between 1 and 3 miles from City Hall? 197) _____
- Enter just an integer (no words) representing the number to the nearest thousand.
- 198) Determine whether the expressions approach a limit as $b \rightarrow \infty$. If they do, give the value of the limit. $b(b+3)^{-2}$, $\frac{2\sqrt{b}-1}{\sqrt{b}}$, $e^{3b}+2$ 198) _____
- Enter your answer as just a, b, c where these are either limits (integers) or the words "no limit" in the same order they appear above separated by commas.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 199) Consider $\lim_{b \rightarrow \infty} \frac{2b-1}{b}$. Which of the following is true? 199) _____
- A) The limit diverges.
 B) The limit exists and is equal to two.
 C) The limit exists and is equal to zero.
 D) The limit exists and is equal to one.
 E) none of these

Evaluate the improper integral whenever it is convergent. If it is divergent, state this.

- 200) $\int_0^{\infty} \frac{11}{(x+1)^2} dx$ 200) _____
- A) 0 B) 11 C) -11 D) Divergent
- 201) $\int_2^{\infty} e^{-5x} dx$ Give your answer in exact form. 201) _____
- A) 0 B) $-e^{-10}$ C) $\frac{e^{-10}}{5}$ D) Divergent

202) $\int_3^{\infty} e^{-x/2} dx$ 202) _____

- A) divergent
- B) $e^{-3/2}$
- C) e^{-1}
- D) $2e^{-3/2}$
- E) none of these

203) $\int_1^{\infty} \frac{dx}{x}$ 203) _____

- A) 0
- B) divergent
- C) -1
- D) 1

204) $\int_1^{\infty} \frac{dx}{x^2}$ 204) _____

- A) $\frac{1}{4}$
- B) divergent
- C) $\frac{1}{2}$
- D) 0
- E) 1

205) $\int_2^{\infty} \frac{dx}{x \ln x}$ 205) _____

- A) $2 \ln 2$
- B) $\ln 2$
- C) $\frac{\ln 2}{2}$
- D) divergent
- E) $\frac{2}{\ln 2}$

206) $\int_2^{\infty} \frac{dx}{x(\ln x)^2}$ 206) _____

- A) divergent
- B) $2 \ln 2$
- C) $\frac{1}{2}(\ln 2)^2$
- D) $\frac{1}{\ln 2}$

207) $\int_{-\infty}^0 e^{10x} dx$ 207) _____

- A) 0
- B) 1
- C) divergent
- D) $\frac{1}{10}$
- E) -1

208) $\int_{-\infty}^{\infty} xe^{-x^2} dx$ 208) _____

- A) -1
- B) 1
- C) 0
- D) divergent
- E) 2

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

209) $\int_{8/3}^{\infty} (3x+1)^{-3/2} dx$

209) _____

Enter your answer as just a reduced fraction or the word "divergent".

210) $\int_0^{\infty} \frac{1}{\sqrt{4x+5}} dx$

210) _____

Enter your answer as just a reduced fraction or the word "divergent".

211) $\int_0^{\infty} \ln x^2 dx$

211) _____

Enter your answer as just a reduced fraction or the word "divergent".

212) $\int_0^{\infty} \frac{(x+1)}{(x+1)^3} dx$

212) _____

Enter your answer as an integer or the word "divergent".

213) $\int_1^{\infty} \frac{x}{(x^2+1)^2} dx$

213) _____

Enter your answer as a reduced fraction or the word "divergent".

214) $\int_0^{\infty} e^{-2x} dx$

214) _____

Enter your answer as a reduced fraction or the word "divergent".

215) $\int_0^{\infty} \frac{1}{\sqrt{x+1}} dx$

215) _____

Enter your answer as a reduced fraction or the word "divergent".

216) $\int_{-\infty}^0 e^{3x+1} dx$

216) _____

Enter your answer as a reduced quotient or the word "divergent".

217) $\int_0^{\infty} x(x+1)^{-3} dx$

217) _____

Enter your answer as a reduced fraction or the word "divergent".

- 218) Recall that the capital value of an asset is given by $\int_0^{\infty} K(t)e^{-rt} dt$. If the annual rate of earnings, $K(t)$, of a certain machine is \$3000 and if the interest rate is 12%, find the capital interest of the machine.
Enter just an integer representing dollars (no units). 218) _____
- 219) Find the area under the graph of $y = 4e^{-3x}$ for $x \geq 1$. Enter your answer as ae^b with any fractions reduced of form $\frac{a}{b}$. 219) _____
- 220) Find the area under the graph of $y = xe^{-x^2}$ for $x \geq 0$. Enter just a reduced fraction. 220) _____

Answer Key

Testname: UNTITLED9

- 1) A
- 2) C
- 3) D
- 4) D
- 5) D
- 6) B
- 7) C
- 8) A
- 9) D
- 10) D
- 11) A
- 12) D
- 13) B
- 14) D
- 15) B
- 16) C
- 17) C
- 18) A
- 19) C
- 20) A
- 21) D
- 22) A
- 23) B
- 24) B
- 25) B
- 26) B
- 27) D
- 28) D
- 29) C
- 30) D
- 31) A
- 32) C
- 33) C
- 34) B
- 35) A
- 36) B
- 37) D
- 38) $-\frac{1}{2}e^{(4-x^2)} + C$
- 39) $\frac{1}{3}(x^2 - 16)^{3/2}$
- 40) $\frac{1}{6}e^{(3x^2 - 6x)} + C$

Answer Key

Testname: UNTITLED9

41) $\ln|4 + xe^x| + C$

42) $\frac{1}{8}(x^2 - 1)^4 + C$

43) $\frac{1}{4}(x^2 + 1)^4 + C$

44) $\frac{1}{9}(x^6 + 100)^6 + C$

45) $4\sqrt{x^2 + 2} + C$

46) $\frac{2}{3}(x^3 + 2x)^{3/2} + C$

47) $\frac{1}{6}(\ln x)^6 + C$

48) $(x^3 - 3x^2)^2 + C$

49) $\ln|e^x + e^{-x}| + C$

50) $\frac{1}{2}e^{x^2} + C$

51) $\frac{1}{3}(x^2 - 4)^{3/2} + C$

52) $\frac{1}{4}(\ln x^2)^2 + C$

53) $\frac{1}{6}e^{3x^2} + C$

54) $\frac{2}{3}(e^x + 2)^{3/2} + C$

55) $\frac{2}{3}\sqrt{x^3 + 6x} + C$

56) $\frac{1}{36}(x^2 + 1)^{18} + C$

57) $\frac{1}{2}e^{(x^2 - 2x)} + C$

58) $-\frac{5}{2}\cos x^2 + C$

59) $\frac{1}{5}\sin^5 x + C$

60) $-2\cos\sqrt{x} + C$

61) $\ln|\ln(\ln x)| + C$

62) $\tan(\ln x) + C$

63) $-\frac{2}{3}\cos^3 x + C$

64) $-\frac{1}{4}(\sin^2 2x)^{-1} + C$

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

66) $\cos(\cos x) + C$

Answer Key

Testname: UNTITLED9

67) $-\ln|\ln(\cos x)| + C$

68) $-\ln|\cos x| + C$

69) $-\frac{1}{2}(\ln(\cos x))^2 + C$

70) $\ln|\cos x + \sin x| + C$

71) $\frac{1}{3}\sin^3 x + C$

72) $e^{\sin x} + C$

73) $\frac{1}{2}\sin(e^{2x}) + C$

74) $-e^{\cos x} + C$

75) $-e^{\csc x} + C$

76) $\sin x - \frac{1}{3}\sin^3 x + C$

77) E

78) B

79) B

80) D

81) C

82) B

83) D

84) B

85) D

86) C

87) D

88) B

89) D

90) D

91) C

92) C

93) D

94) D

95) D

96) D

97) A

98) C

99) B

100) D

101) B

102) D

103) yes

104) yes

105) no

Answer Key

Testname: UNTITLED9

- 106) yes
- 107) yes
- 108) no
- 109) yes
- 110) no
- 111) no
- 112) yes
- 113) yes
- 114) no
- 115) yes
- 116) no
- 117) yes
- 118) yes
- 119) no
- 120) yes
- 121) yes
- 122) no
- 123) yes
- 124) yes
- 125) yes
- 126) yes
- 127) no
- 128) yes
- 129) no
- 130) D
- 131) D
- 132) D
- 133) B
- 134) B
- 135) C
- 136) C
- 137) C
- 138) B
- 139) D
- 140) B
- 141) A
- 142) B
- 143) B
- 144) C
- 145) A
- 146) A
- 147) E
- 148) $\frac{5}{28}$

Answer Key

Testname: UNTITLED9

- 149) ln 3
- 150) yes
- 151) yes
- 152) yes
- 153) yes
- 154) A
- 155) D
- 156) A
- 157) 1.09
- 158) 7200
- 159) D
- 160) A
- 161) 1.12
- 162) C
- 163) D
- 164) D
- 165) C
- 166) B
- 167) 1.10
- 168) C
- 169) E
- 170) 16, 16, 16
- 171) 9.28, 8.86, 9
- 172) 4.83, 5.46, $\frac{16}{3}$
- 173) 0.42, 0.39, 0.40
- 174) 1.20, 1.46, 1.29
- 175) 1.10, 1.10
- 176) 0.79, 0.78
- 177) 1.11, 1.12
- 178) 0.50, 0.50
- 179) 0.25, 0.27
- 180) 0.20, 0.22
- 181) 0.20, 0.21
- 182) 4.47, 4.66
- 183) 60, 60
- 184) A
- 185) A
- 186) A
- 187) A
- 188) C
- 189) C
- 190) C

Answer Key

Testname: UNTITLED9

191) 33,737

192) 12,204,000

193) B

194) B

195) B

196) A

197) 650,000

198) 0, 2, no limit

199) B

200) B

201) C

202) D

203) B

204) E

205) D

206) D

207) D

208) C

209) $\frac{2}{9}$

210) divergent

211) divergent

212) 1

213) $\frac{1}{4}$

214) $\frac{1}{2}$

215) divergent

216) $\frac{e}{3}$

217) $\frac{1}{2}$

218) 25,000

219) $\frac{4}{3}e^{-3}$

220) $\frac{1}{2}$