



Calculus 2 Workbook

Improper integrals

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MATH

IMPROPER INTEGRALS, CASE 1

- 1. Evaluate the improper integral.

$$\int_1^{\infty} \frac{5}{x^3} dx$$

- 2. Evaluate the improper integral.

$$\int_3^{\infty} \frac{7}{(x-2)^2} dx$$

- 3. Evaluate the improper integral.

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

- 4. Evaluate the improper integral.

$$\int_0^{\infty} \frac{3x}{2+2x^2} dx$$



IMPROPER INTEGRALS, CASE 2

- 1. Evaluate the improper integral.

$$\int_{-\infty}^0 e^{3x} dx$$

- 2. Evaluate the improper integral.

$$\int_{-\infty}^1 xe^{x^2} dx$$

- 3. Evaluate the improper integral.

$$\int_{-\infty}^{-2} \frac{2}{x-1} - \frac{2}{x+1} dx$$

- 4. Evaluate the improper integral.

$$\int_{-\infty}^3 \frac{3}{x^2+9} dx$$

- 5. Evaluate the improper integral.



$$\int_{-\infty}^0 \frac{2 \, dx}{e^x}$$

■ 6. Evaluate the improper integral.

$$\int_{-\infty}^0 4e^{-4x} \, dx$$



IMPROPER INTEGRALS, CASE 3

- 1. Evaluate the improper integral.

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

- 2. Evaluate the improper integral.

$$\int_{-\infty}^{\infty} \frac{3 dx}{x^2 + 1}$$

- 3. Evaluate the improper integral.

$$\int_{-\infty}^{\infty} x^2 + 7x + 1 dx$$

- 4. Evaluate the improper integral.

$$\int_{-\infty}^{\infty} 3x^2 e^{-x^3} dx$$



IMPROPER INTEGRALS, CASE 4

- 1. Evaluate the improper integral.

$$\int_{-\frac{\pi}{2}}^0 \frac{3 \cos x}{2 \sin x} dx$$

- 2. Evaluate the improper integral.

$$\int_{-8}^0 \frac{e^x dx}{e^x - 1}$$

- 3. Evaluate the improper integral.

$$\int_{-9}^0 \frac{e^{\sqrt{-x}} dx}{\sqrt{-x}}$$

- 4. Evaluate the improper integral.

$$\int_1^3 \frac{2x - 3}{\sqrt{3x - x^2}} dx$$

- 5. Evaluate the improper integral.



$$\int_0^{2\sqrt{2}} \frac{x}{\sqrt{8-x^2}} dx$$

■ 6. Evaluate the improper integral.

$$\int_1^3 \frac{x-1}{x^2-4x+3} dx$$



IMPROPER INTEGRALS, CASE 5

- 1. Evaluate the improper integral.

$$\int_0^2 \frac{3}{\sqrt[3]{x}} dx$$

- 2. Evaluate the improper integral.

$$\int_{-1}^5 \frac{3}{\sqrt{x+1}} dx$$

- 3. Evaluate the improper integral.

$$\int_3^7 \frac{5}{x-3} dx$$

- 4. Evaluate the improper integral.

$$\int_0^6 \frac{9}{5\sqrt[4]{x^3}} dx$$

- 5. Evaluate the improper integral.



$$\int_{-1}^7 \frac{x^2}{x^3 + 1} dx$$

■ 6. Evaluate the improper integral.

$$\int_{-4}^4 \frac{x + 4}{x^2 + 8x + 16} dx$$



IMPROPER INTEGRALS, CASE 6

- 1. Evaluate the improper integral.

$$\int_{-2}^2 \frac{3}{2\sqrt[5]{x^3}} dx$$

- 2. Evaluate the improper integral.

$$\int_0^4 \frac{7 dx}{2(x-2)^2}$$

- 3. Evaluate the improper integral.

$$\int_{-27}^8 \frac{3 dx}{\sqrt[3]{x}}$$

- 4. Evaluate the improper integral.

$$\int_{-3}^3 \frac{x+2}{x^2-4} dx$$

- 5. Evaluate the improper integral.



$$\int_0^6 \frac{4}{x-3} - \frac{4}{x+3} dx$$



COMPARISON THEOREM

- 1. Use the Comparison Theorem to say whether the integral converges or diverges.

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

- 2. Use the Comparison Theorem to say whether the integral converges or diverges.

$$\int_1^{\infty} \frac{1}{5x + e^x} dx$$

- 3. Can we use the harmonic series $1/x$ as a comparison series to say whether or not the integral converges?

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



