8.4a Improper Integrals

Evaluate using your calculator

$$\int_1^{100} \frac{1}{x}\,dx =$$

$$\int_1^{1000} \frac{1}{x}\,dx =$$

$$\int_1^{1,000,000} \frac{1}{x}\,dx =$$

Do you think $\int_1^{\infty} \frac{1}{x}\,dx$

converges or diverges?

If it converges, to what value does it converge?

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Evaluate using your calculator

$$\int_1^{100} e^{-x}\,dx =$$

$$\int_1^{1000} e^{-x}\,dx =$$

Do you think $\int_1^{\infty} e^{-x}\,dx$

converges or diverges?

If it converges, to what value does it converge?

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1st type of improper integral: infinite limits

$\int_{}^{\infty}$ or $\int_{-\infty}^{}$ or $\int_{-\infty}^{\infty}$ has an ∞ or $-\infty$ in the bounds

$$\int_{1}^{\infty}\frac{1}{x}dx$$

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$$\int_{1}^{\infty}e^{-x}dx$$

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$$\int_1^{\infty} xe^{-x}\,dx$$

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2nd type: one of the bounds is an asymptote

$$\int_0^1 \frac{1}{\sqrt{x}}\,dx$$

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3rd type: there is an asymptote within the bounds of the limit

$$\int_0^3 \frac{1}{(x-1)^{\frac{2}{3}}}\,dx$$

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

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