8.4a Improper Integrals

Evaluate using your calculator

$$\int_{1}^{100} \frac{1}{x} dx =$$

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

$$\int_{1}^{1000} \frac{1}{x} dx =$$

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

If it converges, to what value does it converge?

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Evaluate using your calculator

$$\int_{1}^{100} e^{-x} dx =$$

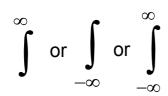
Do you think
$$\int_{1}^{\infty} e^{-x} dx$$

converges or diverges?

$$\int_{1}^{1000} e^{-x} dx =$$

If it converges, to what value does it converge?

1st type of improper integral: infinite limits

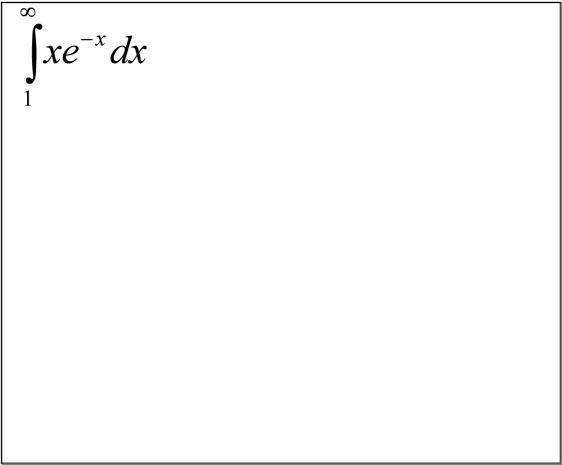


has an ∞ or $-\infty$ in the bounds

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

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



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2nd type: one of the bounds is an asymptote

$$\int_{0}^{1} \frac{1}{\sqrt{x}} dx$$

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