

For each integral, explain why it is improper, and determine whether the integral converges or diverges.

1. $\int_1^{\infty} \frac{1}{x^3} dx$

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

3. $\int_1^{\infty} \frac{1}{\sqrt{x}} dx$

4. $\int_1^{\infty} \frac{1}{x^p} dx$ where $p > 1$

5. $\int_1^{\infty} \frac{1}{x^p} dx$ where $p < 1$

Recap for Today

- We can naturally interpret

$$\int_a^{\infty} f(x) dx = \lim_{t \rightarrow \infty} \int_a^t f(x) dx$$

- You can't just look at the graph of the function and determine if the *improper integral* converges or diverges.

That is, $\lim_{x \rightarrow \infty} f(x)$ may converge, but $\int_1^{\infty} f(x) dx$ may diverge.