

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.  $\int_0^1 \frac{1}{x^3} dx$

5.  $\int_0^1 \frac{1}{\sqrt{x}} dx$