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

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

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

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

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

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