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. $\displaystyle\int_{1}^{\infty} \frac{1}{x^p}\, dx$ where $p > 1$

5. $\displaystyle\int_{1}^{\infty} \frac{1}{x^p}\, dx$ where $p < 1$

Recap for Today

- We can naturally interpret
$$\int_a^\infty f(x)\ dx = \lim_{t\to\infty}\int_a^t f(x)\ dx$$

- You can't just look at the graph of the function and determine if the *improper integral* converges or diverges. That is, $\lim_{x\to\infty} f(x)$ may converge, but $\int_1^\infty f(x)\ dx$ may diverge.