

WORKSHEET FOR 3/4/2009

Reading assignment for Friday. Read section 10.2.

Homework due Friday. 10.1: 7, 8, 9, 10, 27, 41, 64 (you do not need to evaluate the integral in 64)

(1) Concepts:

(a) What makes an integral improper?

(b) What does it geometrically mean for an improper integral to converge? Diverge?

(2) Think back to calculus I, and evaluate the following limits ($q > 0$):

$$\begin{aligned} \lim_{x \rightarrow \infty} \frac{1}{x} & \quad \lim_{x \rightarrow \infty} e^x & \quad \lim_{x \rightarrow \infty} e^{-x} & \quad \lim_{x \rightarrow \infty} \ln x \\ \lim_{x \rightarrow \infty} \frac{1}{x^q} & \quad \lim_{x \rightarrow 0} \frac{1}{x} & \quad \lim_{x \rightarrow 0} e^x & \quad \lim_{x \rightarrow 0} e^{-x} \\ & \quad \lim_{x \rightarrow 0} \ln x & \quad \lim_{x \rightarrow 0} \frac{1}{x^q} \end{aligned}$$

(3) Evaluate the following improper integrals.

$$\int_1^{\infty} \frac{1}{x^{0.9}} dx$$

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

$$\int_1^{\infty} \frac{1}{x^{1.1}} dx$$

$$\int_0^1 \frac{1}{x^{0.9}} dx$$

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

$$\int_0^1 \frac{1}{x^{1.1}} dx$$

(4) *More Practice:* Evaluate the following improper integrals.

$$\int_0^2 \frac{1}{\sqrt{|x-1|}} dx \quad \int_0^{\infty} e^{-3x} dx$$