

Polytechnic University

MA 1132

WORKSHEET I
INSTRUCTOR: MANOCHA

Due: Wednesday, January 31, 2007

(1) The following integrals are improper? Explain why.

(a) $\int_{-2}^{10} \frac{x}{\log x^2} dx$

(b) $\int_0^{2e} \frac{1}{\cos x} dx$

(c) $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \tan 2\theta d\theta$

(d) $\int_{-1}^3 \frac{5}{x^{5/3}} dx$

(2) Find the area under the curve $y = xe^{-x}$ for $x \geq 0$.

(3) Evaluate the following integrals, if they converge.

(a) $\int_1^7 \frac{dx}{(x-2)^{6/7}}$

(b) $\int_{e^2}^{\infty} \frac{dx}{x(\ln x)^3}$

(c) $\int_3^{\infty} \frac{dx}{x(\ln x)^4}$

(d) $\int_{-\infty}^{\infty} \frac{dz}{4z^2 + 49}$

(e) $\int_1^{\infty} \frac{z}{4z^2 + 49} dz$

- (4) Determine whether each of the following improper integrals converges or diverges. For each convergent integral, find its **exact** value.

(a) $\int_0^{\infty} \frac{e^x}{e^x + 1} dx$

(b) $\int_0^{\infty} \frac{e^x}{e^{2x} + 1} dx$

- (5) Use the comparison principle to determine if the following improper integral converges.

(a) $\int_0^1 \frac{d\theta}{\sqrt{\theta^3 + \theta}}$

(b) $\int_1^{\infty} \frac{d\theta}{\sqrt{\theta^3 + \theta}}$

(c) $\int_0^1 \frac{d\theta}{\sqrt{\theta^3 - \theta^5}}$

(d) $\int_0^{\infty} e^{-2\theta}(2 \sin 2\theta + 3) d\theta$