

PROBLEM SET 7: IMPROPER INTEGRALS

Note: Most of the problems were taken from the textbook [1].

Problem 1. *Decide whether the following integrals are convergent or divergent. In case of convergence, evaluate the integral.*

a) $\int_2^{\infty} e^{-5x} dx$

b) $\int_0^{\infty} \sin^2 x dx$

c) $\int_0^{\infty} \cos x dx$

d) $\int_2^{\infty} \frac{dx}{x^2-2x-3}$

e) $\int_1^{\infty} \frac{\ln x}{x} dx$

f) $\int_{-2}^{14} \frac{dx}{\sqrt[4]{x+2}}$

g) $\int_0^9 \frac{dx}{\sqrt[3]{x-1}}$

h) $\int_0^4 \frac{dx}{x^2-x-2}$

Problem 2. *Which of the following integrals converges?*

a) $\int_1^{\infty} \frac{dx}{\sqrt{x+x\sqrt{x}}}$

b) $\int_0^1 \frac{\sec^2 x}{x\sqrt{x}} dx$

c) $\int_0^{\infty} \frac{\arctan x}{2+e^x} dx$

d) $\int_0^{\pi} \frac{\sin^2 x}{\sqrt{x}} dx$

REFERENCES

- [1] J. Stewart: *Single Variable Calculus* 8th Edition, Cengage Learning, Boston 2015.