

## PROBLEM SET 4: INTEGRAL OF RATIONAL FUNCTIONS BY PARTIAL FRACTIONS

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

**Problem 1.** *Express the following rational functions in partial fraction decomposition without finding the numerical values of the coefficients.*

a)  $\frac{1}{x^2+x^4}$

b)  $\frac{x^2-1}{x^3+x^2+x}$

c)  $\frac{x^5+1}{(x^2-x)(x^4+2x^2+1)}$

**Problem 2.** *Evaluate the following integrals:*

a)  $\int \frac{3x-2}{x+1} dx$

b)  $\int \frac{ax}{x^2-bx} dx$

c)  $\int \frac{4x}{x^3+x^2+x+1} dx$

d)  $\int \frac{x^3-3x+7}{(x^2-4x+6)^2} dx$

**Problem 3.** *Solve the following integrals.*

a)  $\int \frac{\sqrt{1+\sqrt{x}}}{x} dx$

b)  $\int \frac{\sec^2 x}{\tan^2 x + 3 \tan x + 2} dx$

c)  $\int \ln(x^2 - x + 2) dx$

d)  $\int x \tan^{-1} x dx$

## REFERENCES

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