

PROBLEM SET 1: INTEGRATION BY PARTS

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

Problem 1. Evaluate the following integrals:

$$a) \int (\ln 4x)^2 dx$$

$$b) \int x \sinh x dx$$

$$c) \int_0^1 \frac{x}{e^{2x}} dx$$

$$d) \int x 7^x dx$$

$$e) \int_1^{\sqrt{3}} \tan^{-1}(1/x) dx$$

$$f) \int x^3 e^{x^2} dx$$

$$g) \int \sin \sqrt{x} dx$$

$$h) \int_1^2 x^4 (\ln x)^2 dx$$

Problem 2. Use substitution and then integration by parts to evaluate the following integrals:

$$a) \int e^{\sqrt{x}} dx$$

$$b) \int \frac{\arcsin(\ln x)}{x} dx$$

Problem 3. For each natural n , show that

$$\int_0^{\pi/2} \sin^{2n} x dx = \frac{1 \cdot 3 \cdot 5 \cdots (2n-1) \pi}{1 \cdot 2 \cdot 4 \cdots 2n} \frac{\pi}{2}.$$

REFERENCES

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