

Analysis
Supplementary problems
Integration techniques

Exercise 1. Use simple substitutions to compute the following integrals:

1.
$$\int_0^1 (2 - 5x)^3 dx \quad (1)$$

2.
$$\int_1^2 \frac{(\log(x))^{10}}{x} dx \quad (2)$$

3.
$$\int_1^2 x^2 \sqrt{2x^3 - 4} dx \quad (3)$$

4.
$$\int_1^2 \frac{\cos(x)}{1 + \sin^2(x)} dx \quad (4)$$

Exercise 2. Use integration by parts to compute:

1.
$$\int_0^1 x \exp(2x) dx \quad (5)$$

2.
$$\int_1^2 \sqrt{x} \log(x) dx \quad (6)$$

3.
$$\int_1^2 x \sin(x) dx \quad (7)$$

4.
$$\int_1^2 \exp(3x) \cos(3x) dx \quad (8)$$

Exercise 3. Compute the following integrals:

1.
$$\int \frac{x^2}{x+1} dx \quad (9)$$

2.
$$\int \frac{(x+1)(x^2+1)}{dx} \quad (10)$$

3.
$$\int \frac{2x-4}{x^2-x} dx \quad (11)$$

4.
$$\int \frac{x+1}{x^3-x^2} dx \quad (12)$$

5.

$$\int \frac{x^3}{\sqrt{x^2+1}} dx \quad (13)$$

Exercise 4. Compute the following integrals:

1.

$$\int \frac{-7}{6x^2 - x - 2} dx \quad (14)$$

2.

$$\int \frac{12x - 8}{6x^2 - x - 2} dx \quad (15)$$

3.

$$\int \frac{2x + 5}{(x^2 + 4x + 4)^2} dx \quad (16)$$

4.

$$\int \frac{2 \exp(2x) - 4 \exp(x)}{\exp(2x) - 4 \exp(x) + 3} dx \quad (17)$$