

LIST 3. Indefinite Integrals

Task 1. Calculate integrals of rational functions:

$$\begin{aligned} a. & \int \frac{2x-5}{x^2-5x+6} dx; & b. & \int \frac{1}{(x+1)(x+2)(x+3)} dx; & c. & \int \frac{x+1}{x(x^2+2x+2)} dx; \\ d. & \int \frac{x^2+1}{(x+1)^2(x-1)} dx; & e. & \int \frac{dx}{(x+1)(x^2+1)}; & f. & \int \frac{(x^2+x+5)dx}{x^3(x^2+4)}. \end{aligned}$$

Task 2. Calculate integrals by parts:

$$\begin{aligned} a. & \int x \arctan x dx; & b. & \int (x^3+3x) \sin 2x dx; & c. & \int e^{-2x} \sin 4x dx; & d. & \int x^2 e^{3x} dx; & e. & \int x e^{-x} dx; \\ f. & \int \frac{\ln x dx}{x^3}; & g. & \int \ln x dx; & h. & \int \left(\frac{\ln x}{x}\right)^2 dx; & i. & \int x^2 \ln x dx; & j. & \int e^{-2x} \sin 4x dx. \end{aligned}$$

Task 3. Calculate integrals by substitutions:

$$\begin{aligned} a. & \int \frac{e^{2x}}{\sqrt{e^x+1}} dx; & b. & \int \frac{(\arcsin x)^2}{\sqrt{1-x^2}} dx; & c. & \int \frac{1}{x\sqrt{1+\ln x}} dx & d. & \int \frac{\sqrt{x^2+1}}{x} dx; \\ e. & \int \frac{dx}{x^2\sqrt{4-x^2}}; & f. & \int \frac{x^3 dx}{\sqrt{x^2-9}} & g. & \int x \sqrt{\frac{x-1}{x+1}} dx. \end{aligned}$$

Task 4: Calculate integrals of trigonometric functions:

$$\begin{aligned} a. & \int \sin^2 x \cos^3 x dx; & b. & \int \sin 3x \cos 5x dx; & c. & \int \cos \frac{x}{2} \cos \frac{x}{3} dx; \\ d. & \int \frac{dx}{\sin x}; & e. & \int \frac{(\sin^2 x + 5) dx}{\cos x} & f. & \int \frac{dx}{3+5\cos x}; & g. & \int \frac{dx}{\sin x + \cos x}. \end{aligned}$$