

Mathematical Analysis. Assignment 7.

Antiderivatives

1. Find the following integrals:

(a) $\int \frac{\sqrt{4+x^2}+2\sqrt{4-x^2}}{\sqrt{16-x^4}} dx;$

(b) $\int 2^{2x} e^x dx;$

(c) $\int \frac{dx}{3x^2-x^4};$

(d) $\int \sin^2 \frac{x}{2} dx;$

(e) $\int \frac{dx}{5-12x-9x^2};$

(f) $\int \frac{dx}{2x^2-5x+7};$

(g) $\int \frac{dx}{\sqrt{x^2-2x+5}};$

(h) $\int \frac{dx}{\sqrt{17-4x-x^2}};$

(i) $\int \frac{3x-2}{2-3x+5x^2} dx;$

(j) $\int \frac{x+3}{\sqrt{3+4x-4x^2}} dx;$

(k) $\int \sqrt{x^2+2x+5} dx;$

(l) $\int \frac{x^5}{x+1} dx;$

(m) $\int x\sqrt{1+x} dx;$

(n) $\int \frac{\sqrt[3]{x} dx}{x(\sqrt{x}+\sqrt[3]{x})};$

(o) $\int e^{2x^2+2x-1}(2x+1) dx;$

(p) $\int \frac{dx}{\cosh x};$

(q) $\int \frac{\ln^2 x}{x} dx;$

(r) $\int \ln \frac{1+x}{1-x} \cdot \frac{dx}{x^2-1};$

2. Find the following integrals:

(a) $\int \frac{\sin x}{\sqrt{\cos 2x}} dx;$

(b) $\int \frac{\ln \tan x}{\sin 2x} dx;$

(c) $\int \frac{\sqrt[3]{\operatorname{arccot} x}}{1+x^2} dx;$

(d) $\int (x^2-2x+3) \ln(x+1) dx;$

(e) $\int \arctan \sqrt{x} dx;$

(f) $\int (x^2-6x+2) e^{3x} dx;$

(g) $\int \sin x \cosh x dx;$

(h) $\int x \arccos \frac{1}{x} dx.$

3. Find integrals of some rational functions:

(a) $\int \frac{x^5-2x^2+3}{x^2-4x+4} dx;$

(b) $\int \frac{dx}{(x-2)^2(x+3)^3};$

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

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

4. Find integrals of some irrational functions:

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

(b) $\int \sqrt[3]{\frac{x+1}{x-1}} dx;$

(c) $\int \frac{dx}{\sqrt[6]{(x-7)^7(x-5)^5}};$

(d) $\int \frac{dx}{\sqrt[3]{4x^2+4x+1}-\sqrt{2x+1}};$

(e) $\int \frac{x^3-6x^2+11x-6}{x^2+4x+3} dx;$

(f) $\int x^2 \sqrt[3]{(x+1)^2} dx;$

(g) $\int \sqrt[3]{1+\sqrt[4]{x}} dx;$

(h) $\int \frac{dx}{\sqrt[3]{1+x^3}}.$

5. Find integrals of some transcendental functions:

(a) $\int \sin x \sin 2x \sin 3x dx;$

(b) $\int \frac{\sin 3x}{\cos x} dx;$

(c) $\int \cos^3 x \sin^8 x dx;$

(d) $\int \frac{\sin^4 x}{\cos x} dx;$

(e) $\int \frac{dx}{\sin^2 x \cos^3 x};$

(f) $\int \frac{\cos^3 x}{\sin^5 x} dx;$

(g) $\int \frac{dx}{\sin^2 x \cos^4 x};$

(h) $\int \frac{\cos x dx}{\sin^2 x - 6 \sin x + 5};$

(i) $\int \frac{dx}{2 \cos^2 x + \sin x \cos x + \sin^2 x};$

(j) $\int \frac{dx}{7 \cos x - 4 \sin x + 8};$

(k) $\int \frac{e^x + e^{3x}}{1 - e^{2x} + e^{4x}} dx;$

(l) $\int \frac{dx}{\sqrt{1+e^x} + \sqrt{1-e^x}};$

(m) $\int \ln(\sqrt{x+1} + \sqrt{x-1}) dx;$

(n) $\int \frac{x dx}{\sin^2 x}.$