RD Sharma Solutions Class 12 Maths Chapter 19 Ex 19.1

Indefinite Integrals Ex 19.1 Q1

(i)

$$\int x^4 dx = \frac{x^{4+1}}{4+1} + c$$
$$= \frac{x^5}{5} + c$$

(ii)

$$\int x^{\frac{5}{4}} dx = \frac{x^{\frac{5}{4}+1}}{\frac{5}{4}+1} + c$$
$$= \frac{x^{\frac{5+4}{4}} + c}{\frac{5+4}{4}}$$
$$= \frac{4x^{\frac{9}{4}}}{9} + c$$

(iii)

$$\int \frac{1}{x^5} dx = \int x^{-5} dx$$
$$= \frac{x^{-5+1}}{-5+1} + c$$
$$= \frac{x^{-4}}{-4} + c$$
$$= \frac{-1}{4x^4} + c$$

(iv)

$$\int \frac{1}{x^{\frac{3}{2}}} dx = \int x^{\frac{-3}{2}} dx$$
$$= \int x^{\frac{-3}{2}} dx$$
$$= \frac{x^{\frac{-3}{2}+1}}{\frac{-3}{2}+1} + c$$
$$= \frac{x^{\frac{-1}{2}}}{\frac{-1}{2}} + c$$
$$= -2 \times \frac{1}{\sqrt{x}} + c$$
$$= \frac{-2}{\sqrt{x}} + c$$

(v)

$$\int 3^x dx = \frac{3^x}{\log 3} + c \qquad \left[\because \int a^x dx = \frac{a^x}{\log a} + c\right]$$

(vi)

$$\int \frac{1}{\sqrt[3]{x^2}}dx = \int \frac{1}{x^{\frac{2}{3}}}dx$$
$$= \int x^{\frac{-2}{3}}dx$$
$$= \frac{x^{\frac{-2}{3}+1}}{\frac{-2}{3}+1} + c$$
$$= \frac{x^{\frac{1}{3}}}{\frac{1}{3}} + c$$
$$= 3\sqrt[3]{x} + c$$

(vii)

$$\int 3^{2\log_3 x}dx = \int 3^{\log_3 x^2}dx$$
$$= \int x^2 dx \qquad \left[\because a^{\log_a x} = x\right]$$
$$= \frac{x^3}{3} + c$$

(viii)

$$\int \log_x x\,dx = \int 1dx$$
$$= x + c.$$

Indefinite Integrals Ex 19.1 Q2

(i)

$$\int \sqrt{\frac{1+\cos 2x}{2}}dx = \int \sqrt{\frac{2\cos^2 x}{2}}dx \qquad \left[\because \cos 2x = 2\cos^2 - 1\right]$$
$$= \int \cos x dx$$
$$= \sin x + c$$

(ii) $$\int \sqrt{\frac{1-\cos 2x}{2}}dx = \int \sqrt{\frac{2\sin^2 x}{2}}dx$$
$$= \int \sin x dx$$
$$= -\cos x + c$$

Indefinite Integrals Ex 19.1 Q3

Evaluate the integral as follows

$$\int \frac{e^{6\log_e x} - e^{5\log_e x}}{e^{4\log_e x} - e^{3\log_e x}}dx = \int \frac{x^6 - x^5}{x^4 - x^3}dx$$
$$= \int \frac{x^5(x-1)}{x^3(x-1)}dx$$
$$= \int x^2 dx$$
$$= \frac{x^3}{3} + C$$

Indefinite Integrals Ex 19.1 Q4

$$\int \frac{1}{a^x b^x} dx = \int a^{-x} b^{-x} dx$$

$$= \int (ab)^{-x} dx$$

$$= \frac{(ab)^{-x}}{\log_e (ab)^{-1}} + c$$

$$= \frac{(ab)^{-x}}{-\log_e (ab)} + c$$

$$= \frac{a^{-x} b^{-x}}{-\log_e (ab)} + c$$

Indefinite Integrals Ex 19.1 Q5

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

$$= \int \frac{\cos 2x + 2\sin^2 x}{\sin^2 x} dx$$

$$= \int \frac{1 - 2\sin^2 x + 2\sin^2 x}{\sin^2 x} dx$$

$$= \int \frac{1}{\sin^2 x} dx$$

$$= \int \operatorname{cosec}^2 x dx$$

$$= -\cot x + c$$

(ii) $\int \frac{2\cos^2 x - \cos 2x}{\cos^2 x} dx$

$$= \int \frac{2\cos^2 x - (2\cos^2 x - 1)}{\cos^2 x} dx$$

$$= \int \frac{2\cos^2 x - 2\cos^2 x + 1}{\cos^2 x} dx$$

$$= \int \frac{1}{\cos^2 x} dx$$

$$= \int \sec^2 x dx$$

$$= \tan x + c$$

Indefinite Integrals Ex 19.1 Q6

$$\int \frac{e^{\log \sqrt{x}}}{x} dx = \int \frac{\sqrt{x}}{x} dx$$

$$= \int x^{\frac{1}{2}} \times x^{-1} dx$$

$$= \int x^{\frac{1}{2}-1} dx$$

$$= \int x^{\frac{-1}{2}} dx$$

$$= \frac{x^{\frac{-1}{2}+1}}{\frac{-1}{2}+1} + c$$

$$= \frac{x^{\frac{1}{2}}}{\frac{1}{2}}$$

$$= 2\sqrt{x} + c$$