

1. Compute the following indefinite integrals.

$$(i) \int \frac{\sin 2x}{1 + \sin^2 x} dx$$

$$(ii) \int \frac{dx}{\sqrt{3+2e^x}}$$

$$(iii) \int \log |2+5x| dx$$

$$(iv) \int \frac{dx}{x(1+\log^2 |x|)}$$

2. Compute the following integrals.

$$(i) \int_0^{\pi/2} \sin^3 x \cos^1 x dx$$

$$(ii) \int_0^{1/2} \frac{(\sin^{-1} x)^2}{\sqrt{1-x^2}} dx$$

$$(iii) \int_{-\infty}^0 \frac{x}{x^2+1} dx$$

$$(iv) \int_0^{\infty} e^{-x} \sin x dx$$

4. Compute the following indefinite integrals.

$$(i) \int \frac{e^x}{\sqrt{3-5e^{2x}}} dx \quad (ii) \int \log(x^2+1) dx$$

$$(iii) \int \frac{\sin^{-1} e^x}{e^x} dx \quad (iv) \int \frac{dx}{(\sin^2 x + 3 \cos^2 x)^2}$$

$$(v) \int (\sin^{-1} x)^2 dx$$

5. Compute the following definite integrals.

$$(i) \int_0^{\pi/2} \tan x dx$$

$$(ii) \int_{-2}^0 \frac{1}{(2-x)^2} \left(\frac{2-x}{2+x} \right)^{1/2} dx$$

$$(iii) \int_0^{\pi/4} x \sec^2 x \, dx \quad (iv) \int_0^{\pi/2} e^{2x} \sin^2 x \, dx$$

6. Obtain a primitive of each of the following functions.

$$(i) x \rightarrow \frac{5 \cos x + 6}{2 \cos x + \sin x + 3}$$

$$(ii) x \rightarrow \frac{\tan^{-1} x}{(1+x^2)^{3/2}}$$

$$(iii) x \rightarrow (\sin^{-1} x)^2$$

7. Obtain the following definite integrals.

$$(i) \int_0^1 \frac{4x^2 + 3}{8x^2 + 4x + 5} \, dx \quad (ii) \int_8^{15} \frac{dx}{(x-3)\sqrt{x+1}}$$

$$(iii) \int_0^{\pi/2} \sin^3 x \cos 2x \, dx \quad (iv) \int_{-1}^1 \frac{\sqrt{1-x^2}}{a-x} \, dx; (a > 1)$$

11. Find a primitive of the function given by the following expressions.

$$(i) \frac{(\log |x|)^2}{x^3}$$

$$(ii) \frac{(\pi - \sin^{-1} x)}{\sqrt{1-x^2}}$$

$$(iii) \frac{1}{\sqrt{x+1} + 3\sqrt{x+1}}$$

$$(iv) \frac{1}{\sin x + \cos x}$$

12. (a) Find the following definite integrals.

$$(i) \int_1^{10} \frac{dx}{x \sqrt{x^2 + x + 1}}$$

$$(ii) \int_{1/2}^1 \frac{2x-3}{(3+4x-4x^2)} \, dx$$

$$(iii) \int_0^{\pi/2} \frac{dx}{(2 + \sin x)^2}$$

15. Obtain a primitive of each of the following functions.

(i) $x \rightarrow \sin^3 x$

(ii) $x \rightarrow \frac{\sin x}{\sqrt{\cos x}}$

(iii) $x \rightarrow \frac{3x}{\cos^3 x^2}$

(iv) $x \rightarrow x^2 \log x$.

16. Compute the following definite integrals.

(i) $\int_0^{\pi/2} e^{2\cos x} \sin x \, dx$

(ii) $\int_{-1}^{+1} x e^x \, dx$

(iii) $\int_1^{-1} e^x (\log x)^2 \, dx$

(iv) $\int_1^3 \frac{dx}{x(1+\log x)^2}$

19. Compute the following indefinite integrals.

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

(ii) $\int \frac{x^{n-1}}{\sqrt{x^n+1}} \, dx$.

34. Compute the following integrals

(i) $\int \frac{dx}{\sqrt{e^{2x}+4e^x+1}}$

(ii) $\int \left(\frac{\log x}{x} \right)^2 \, dx$

35. Find a primitive of the following functions.

(i) $x \rightarrow \cos x \cos 2x \cos 3x$,

(ii) $x \rightarrow \frac{x}{1+x^3}$,

(iii) $x \rightarrow e^x \log x$,

24. Evaluate the following definite integrals.

$$(i) \int_0^{\infty} \frac{x^2}{1+x^4} dx$$

$$(ii) \int_2^3 \frac{x^2 dx}{(x-1)^2 (x^2+1)}$$

$$(iii) \int_0^{\pi} e^{1/2x} \cos^2 x dx$$

$$(iv) \int_{-2}^{-1} x^2 e^{-2x} dx$$

$$(v) \int \sin^{-1} \left(\frac{2\sqrt{x}}{1+x} \right) dx$$

$$(vi) \int \frac{2+\sin x}{\sin x (1+\cos x)} dx$$

25. Compute the following definite integrals.

$$(i) \int_0^1 \frac{dx}{\sqrt{4x-4x^2}}$$

$$(ii) \int_{\pi/2}^{2\pi/3} \frac{\cos^2 x}{\sin x} dx$$

$$(iii) \int_1^2 x(x^2+1) e^{x^2} dx$$

$$(iv) \int_0^1 x \tan^{-1} x dx$$

28. Obtain a primitive of each of the functions given by the following expressions.

$$(i) \frac{1}{(1+\sin x) \tan x}$$

$$(ii) \frac{e^x}{e^{2x}-3e^x+2}$$

$$(iii) (x^3+x) e^{-x^2}$$

$$(iv) x \tan^{-1} x.$$

29. Evaluate the following definite integrals

$$(i) \int_0^2 (x-2) e^x dx$$

$$(ii) \int_{\pi}^3 \frac{x^3+2x^2+3x-1}{(x-1)^2} dx$$

$$(iii) \int_1^6 (2x+3 \log x) dx$$