

CM 2607 Advanced Mathematics for Data Science

Tutorial No 04

01) Integrate the following functions with respect to x .

i) $2x^4 + \frac{3}{x^2} - \frac{1}{4\sqrt{x}}$

ii) $\frac{2}{x^2} - \frac{3}{5+x^2}$

iii) $2 \sin x - \frac{5}{2}e^x - 3 \operatorname{cosec}^2 x$

iv) $\frac{x^4 - 3x^3}{\sqrt{x}}$

v) $\frac{2x^3 - 5x^{9/2}}{x^3}$

vi) $2 \cos x + 3 \sec^2 x$

vii) $3 \sec x (\sec^x + 2 \tan x)$

viii) $\left(x^2 + \frac{3}{\sqrt{x}}\right)^2$

02) Integrate the following functions with respect to x .

i) $3(4x + 3)^{5/2}$

ii) $3\sqrt{4x - 3}$

iii) $\sec^2(5 - 3x)$

iv) $7e^{3x+2} - 4e^{-x+7}$

v) $\frac{1}{8-3x}$

vi) $\frac{4}{4+(3x-1)^2}$

vii) $\frac{1}{\sqrt{9-(3x-2)^2}}$

viii) $\frac{-4}{\sqrt{4-(2x-3)^2}}$

03) Integrate the following functions with respect to x .

i) $\tan(2x + 3)$

$$\text{ii)} \quad \frac{e^{2x}}{e^{2x}-7}$$

$$\text{iii)} \quad \frac{x^2 - e^{3x}}{x^3 - e^{3x}}$$

$$\text{iv)} \quad \frac{3-3 \sin x}{4x+4 \cos x}$$

$$\text{v)} \quad \frac{\sin 2x + \cos 2x}{\sin 2x - \cos 2x}$$

04) Evaluate the following integrals.

$$\text{i)} \quad \int_1^3 \sqrt{7x-1} \, dx$$

$$\text{ii)} \quad \int_2^6 \frac{1}{4s+7} \, ds$$

$$\text{iii)} \quad \int_0^4 \frac{5}{3+e^{-x}} \, dx$$

$$\text{iv)} \quad \int_{\pi/6}^{\pi/2} \cos\left(\frac{\pi}{3} - x\right) \, dx$$

$$\text{v)} \quad \int_0^{\pi/4} \cos 3\theta \cdot \cos \theta \, d\theta$$

05) Evaluate the following integrals.

$$\text{i)} \quad \int_0^2 \frac{x+3}{(x-1)(x^2+3)} \, dx$$

$$\text{ii)} \quad \int_0^1 \frac{x-1}{(2x+3)(x-2)} \, dx$$

$$\text{iii)} \quad \int_{-1}^1 \frac{x^2+4x}{x^3+1} \cdot dx$$

$$\text{iv)} \quad \int_0^1 \left(\frac{3x}{3x-1}\right)^2 \, dx$$

$$\text{v)} \quad \int_{-1}^0 \frac{x^2-4x+5}{(x-2)(x-3)} \, dx$$

$$\text{vi)} \quad \int_1^2 \frac{3x^2-2}{x+1} \, dx$$