



Mathematics 1 Module  
Series 05 (INTEGRALS).

**Exercise 01:** Find the antiderivatives of the following functions

1)  $f(x) = 2x - 1$

2)  $f(x) = x^2 - 4x + 3$

3)  $f(x) = -3x^3 + 5x^2 - 4$

4)  $f(x) = x^4 - x^3$

6)  $f(x) = \frac{1}{x^2} - \frac{1}{x^3}$

5)  $f(x) = \frac{4}{x^2}$

8)  $f(x) = \cos 2x - \sin 3x$

7)  $f(x) = \sin x \cdot \cos^3 x$

**Exercise 02:** Find the antiderivatives of the following functions

1)  $f(x) = \frac{x+1}{(x^2+2x)^3}$  , 2)  $f(x) = \frac{x}{x^2-1}$  , 3)  $f(x) = x - 1 + \frac{\ln x}{x}$

**Exercise 03:** Use integration by parts to find the following values

$$I_1 = \int_1^e x \ln(x) dx, \quad I_2 = \int_1^{\frac{\pi}{2}} x \sin(x) dx, \quad I_3 = \int x e^x dx.$$

**Exercise 04:** Evaluate the integrals by substitution

1)  $\int_0^1 \frac{e^x}{\sqrt{e^x+1}} dx$  , 2)  $\int \frac{x}{\sqrt{9+4x^2}} dx$  , 3)  $\int \frac{dx}{1+\sqrt{1-x}}$

Revision exercises

1) Show that the :

a)  $\int_0^{\frac{\pi}{4}} \cos 2t dt = \frac{1}{2}$ .

b)  $\int_0^{\frac{\pi}{4}} \sin 2t dt = \frac{1}{2}$ .

c)  $\int_1^e \ln t dt = 1$ .

d)  $\int_0^{\frac{\pi}{3}} \frac{\sin t}{\cos^2 t} dt = 1$ .

2) calculate the following integrals

$$F(t) = 2 \int \frac{t^2}{t^2-1} dt$$

$$G(x) = \int \sqrt{e^x+1} dx$$