University of Oum El Bouaghi

Faculty of Economic Sciences, Commercial Sciences and Management Sciences

First year, common trunk

Academic year: 2023-2024



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

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6)
$$f(x) = \frac{1}{x^2} - \frac{1}{x^3}$$
 5) $f(x) = \frac{4}{x^2}$

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

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 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) $f(x) = x-1+\frac{\ln x}{x}$

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

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)
$$\int_0^1 \frac{e^x}{\sqrt{e^x+1}} dx$$

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

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)
$$\int_{1}^{c} \ln t dt = 1.$$

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

2) calculate the following integrals

$$F(t) = 2 \int \frac{t^2}{t^2 - 1} dt \qquad G(x) = \int \sqrt{e^x + 1} dx$$

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