Learning Enhancement Team

University of East Anglia
STUDENT SUPPORT SERVICE

Worksheet: Integration and Natural Logarithms

Model answers to this sheet

Integration and Natural Logarithms study guide

This worksheet will help you identify and then do integrals which fit the following pattern:

$$\int \frac{f'(x)}{f(x)}dx = \ln(f(x)) + c$$

1. Do the following integrals:

(a) $\int \frac{2}{2x+5}dx$ (b) $\int \frac{3-4x}{6+3x-2x^2}dx$ (c) $\int \frac{1-e^{-x}}{x+e^{-x}}dx$ (d) $\int \frac{1}{t\ln t}dt$

2. Calculate the definite integrals:

(a) $\int_3^4 \frac{1}{x-2}dx$ (b) $\int_0^1 \frac{-2x}{3-x^2}dx$ (c) $\int_3^4 \frac{2x-4}{(x-2)^2}dx$ (d) $\int_1^{1.5} \frac{3-2x}{3x(1-\frac{1}{3}x)}dx$

3. Do the following integrals:

(a) $\int \frac{x^2}{1-x^3}dx$ (b) $\int \tan(2\theta)d\theta$ (c) $\int \frac{15x^3}{3x^4+2}dx$ (d) $\int \frac{3e^{2t}+3}{e^{2t}+2t}dt$

4. Calculate the definite integrals:

(a) $\int_{-2}^{-1} \frac{1}{3-x}dx$ (b) $\int_5^6 \frac{2}{x-3}dx$ (c) $\int_0^2 \frac{x^2+1}{x^3+3x+7}dx$ (d) $\int_0^{\pi/2} \tan\left(\frac{\theta}{3}\right)d\theta$

5. Which of the following integrals can be worked out using pattern at the beginning of the sheet? Do the ones that can and try to suggest ways of doing the others.

(a) $\int \frac{x^2+2}{2}dx$ (b) $\int \frac{3-x^2}{-2x}dx$ (c) $\int \frac{x+3}{x^2-9}dx$ (d) $\int \frac{9x^2}{3x^2+x}dx$

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