Outcome 1 – Integrating rational functions

Advanced Higher Formula sheet

$f(x)$	$\int f(x)\,dx$
$\frac{1}{x}$	$\ln\|x\| + c$

Key Facts/Formulae:

A rational function is in the form of an algebraic fraction where the numerator and the denominator are polynomials.

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

Worked Example:

Calculate $\int \frac{12}{3x-5}\,dx$

1. Take the constant out

$$12\int \frac{1}{3x-5}\,dx$$

2. Get in a form you can integrate

$$4\int \frac{3}{3x-5}\,dx = 4\ln|3x-5| + c$$

3. Integrate!

Questions…

Calculate each of the following integrals.

1. $\int \frac{1}{x+7}\,dx$

2. $\int \frac{8}{x-9}\,dx$

3. $\int \frac{10}{2x-7}\,dx$

4. $\int \frac{3}{6x+5}\,dx$

5. $\int \frac{2x}{x^2+5}\,dx$

6. $\int \frac{15x^2}{x^3-2}\,dx$

Answers

1. $\ln|x+7|+c$

2. $8\ln|x-9|+c$

3. $5\ln|2x-7|+c$

4. $\frac{1}{2}\ln|6x+5|+c$

5. $\ln|x^2+5|+c$

6. $5\ln|x^3-2|+c$