Author John J Weber III, PhD | **email** John.Weber@gpc.edu
Updated 29 December 2014 | **Page** 1/1
URL: http://www.jjw3.com/r/partialFractions.pdf

jjw3.com

1 Partial Fractions

Used for integrals in the form $\int \frac{P(x)}{Q(x)}dx$.

1.1 Requirements

- The degree of $P(x)$ < the degree of $Q(x)$
- $Q(x)$ is completely factorable into a product of linear and *irreducible* quadractic factors

1.2 Partial Fractions

Factor in Denominator	Partial Fraction(s)
$ax+b$	$\frac{A}{ax+b}$
$(ax+b)^2$	$\frac{A_1}{ax+b}+\frac{A_2}{(ax+b)^2}$
In general, $(ax+b)^n$	$\frac{A_1}{ax+b}+\frac{A_2}{(ax+b)^2}+\cdots+\frac{A_n}{(ax+b)^n}$
(ax^2+bx+c)	$\frac{Ax+B}{(ax^2+bx+c)}$
$(ax^2+bx+c)^2$	$\frac{A_1x+B_1}{ax^2+bx+c}+\frac{A_2x+B_2}{(ax^2+bx+c)^2}$
In general, $(ax^2+bx+c)^n$	$\frac{A_1x+B_1}{ax^2+bx+c}+\frac{A_2x+B_2}{(ax^2+bx+c)^2}+\cdots+\frac{A_nx+B_n}{(ax^2+bx+c)^n}$

A quadratic is irreducible when $b^2-4ac<0$.

1.3 Mathematica

Apart[$P(x)/Q(x)$]

If $P(x)$ or $Q(x)$ has more than 1 term (i.e., has + or −), then you **MUST** use parentheses to group the terms.