# § 7.4 Partial fractions

## Summary

When we have a rational function

$$\frac{f(x)}{g(x)}$$

where $f, g$ are polynomials and $\deg f < \deg g$ we use the method of partial fractions as follows:

(1) for each linear factor of $g(x)$, $x - c$, we use

$$\frac{A}{x - c}$$

(2) for a repeated linear factor $(x-c)^n$, we use

$$\frac{A_1}{x-c} + \frac{A_2}{(x-c)^2} + \cdots + \frac{A_n}{(x-c)^n}$$

(3) for an unfactorable quadratic $q(x)$ (e.g. $x^2 + 1$) we use

$$\frac{Ax + B}{q(x)}$$

# Examples   (from Wednesday worksheet)

(c) $\displaystyle \int \frac{1}{x^3 - x^2}\, dx$

(d) $\displaystyle \int \frac{10x + 2}{(x-5)(x^2 + 1)}\, dx$