Partial fractions

$$\frac{f(x)}{(ax+b)(cx+d)} = \frac{A}{ax+b} + \frac{B}{cx+d}$$

$$\frac{f(x)}{(ax+b)(cx+d)^2} = \frac{A}{ax+b} + \frac{B}{cx+d} + \frac{C}{(cx+d)^2}$$

$$\frac{f(x)}{(ax+b)(x^2+c)} = \frac{A}{ax+b} + \frac{Bx+C}{x^2+c}$$

Factor theorem

If $x - c$ is a factor of P(x), $f(c) = 0$

If $ax + b$ is a factor of P(x), $f(-\frac{b}{a}) = 0$

Remainder theorem

If P(x) is divided by $x - c$, remainder is $f(c)$

If P(x) is divided by $ax - b$, remainder is $f(-\frac{b}{a})$

Algebraic rules

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

$$a^2 - b^2 = (a - b)(a + b)$$

$$(a \pm b)^3 = (a \pm b)(a^2 \mp 2ab + b^2)$$

$$a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$$

$$(x + a)(x + b) = x^2 + (a + b)x + ab$$

$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$$