Partial fractions decomposition allows us to represent a rational function in a particularly useful way for calculus. Since it is fundamentally an algebra technique, we study it in pre-calculus.

Here are some high level notes a student requested that I post. All of this material is in your textbook, although the Heaviside cover-up is not described in the same way.

1. If the degree of the numerator is greater than or equal to the degree of the denominator, use long division. Only the remainder will be subjected to further partial fractions decomposition.
2. Factor the denominator completely into products of linear factors, perhaps of multiplicity greater than one, and irreducible quadratic factors, perhaps of multiplicity greater than one. This is possible because of Chapter 3!
3. The following table should be committed to memory.

|  |  |  |
| --- | --- | --- |
| ***Each factor of this form in denominator*** | ***Generates term(s) of the form***  ***In the partial fraction decomposition*** | ***Comments*** |
|  |  | Only these may be done via Heaviside cover-up! |
|  |  | Clearly includes the first row as a special case |
|  |  | This case addresses the non-real roots of the denominator. |
|  |  | Clearly includes the third row as a special case. |