**Partial Fractions (Review Topic from Precalculus)**

 **Procedure for Decomposing a Rational Expression into Partial Fractions**

Consider , such that  and  have no common factors.

1. Factor  into linear factors and/or irreducible quadratic factors.

 Linear factors may be distinct: 

or

 Linear factors may be repeated *k* times: 

 and similarly,

 Quadratic factors may be distinct: 

or

 Quadratic factors may be repeated *k* times: 

1. Assign to each factor a sum of partial fractions as follows:
* For each distinct linear factor , assign the partial fraction  .
* For each repeated linear factor , assign the sum of *k* partial fractions

  .

* For each distinct quadratic factor , assign the partial fraction  .
* For each repeated quadratic factor , assign the sum of k partial fractions

 

1. Applying algebraic methods, create a system of equations involving coefficients A, B, C, etc.
2. Solve the system for A, B, C, etc. using elimination or substitution or matrices, etc.
3. Using these constants in the numerators, rewrite the rational expression as a sum of partial fractions.

**Example #1: Distinct linear factors.**

Perform partial fraction decomposition on 

Set-up: 

**Example #2: Repeated linear factors.**

Perform partial fraction decomposition on 

Set-up: 

**Example #3: Distinct quadratic factors.**

Perform partial fraction decomposition on 

Set-up: 

**Example #4: Repeated quadratic factors.**

Perform partial fraction decomposition on 

Set-up: 