Finding the Partial Fraction Decomposition (PFD) of $\frac{P(x)}{Q(x)}$

when the deg P(x) < deg Q(x) :

1) **Identify the <u>Basic Form</u> of the PFD (factor Q(x) as far as possible)**

2) **Write Equation: $\frac{P(x)}{Q(x)}$ = Basic Form**

3) **Multiply by Q(x) and solve for the unknowns A, B, C, etc.**

Example: Let $\frac{P(x)}{Q(x)} = \frac{2x-17}{x^2-5x+4} = \frac{2x-17}{(x-1)(x-4)}$

<u>Basic Form</u>

$$\frac{P(x)}{Q(x)} = \frac{2x-17}{(x-1)(x-4)} = \frac{A}{(x-1)} + \frac{B}{(x-4)}$$

Q(x) (----------) = (----------) **Q(x)**

$$(x-1)(x-4)\left(\frac{2x-17}{(x-1)(x-4)}\right) = \left(\frac{A}{(x-1)} + \frac{B}{(x-4)}\right)(x-1)(x-4)$$

Solve for A and B in : $2x-17 = A(x-4) + B(x-1)$

Set x = 1 : $2-17 = A(1-4) + B(1-1) \rightarrow -15 = -3A \rightarrow A = 5$

Set x = 4 : $8-17 = A(4-4) + B(4-1) \rightarrow -9 = 3B \rightarrow B = -3$

The P. F. D.

$$\frac{2x-17}{(x-1)(x-4)} = \frac{5}{(x-1)} + \frac{-3}{(x-4)}$$