Frequently Asked Questions on Partial Fractions (Section 7.4)

1. Is there a particular method I should use to solve the linear equations?

2. The right side of the expansion only depends on the denominator of the integrand. Where does the numerator come in?

3. I did a partial fraction expansion, and I got back the original integrand. What happened?

1. Is there a particular method I should use to solve the linear equations?

Answer: No — you can use any method that you have learned for solving a system of linear equations.

If you properly set up your partial fraction expansion, **you will have exactly as many linear equations as unknown constants** (A, B, C, etc.), and there will be a unique solution to the system of equations.

2. The right side of the expansion only depends on the denominator of the integrand. Where does the numerator come in?

Answer: On the left side of the partial fraction expansion.

$$\frac{P(x)}{Q(x)} = \text{p. f. expansion}$$

After multiplying through by Q(x), you will have

$$P(x) = \text{polynomial in x}$$

Next you equate the coefficients of corresponding powers of x to get your linear equations.

3. I did a partial fraction expansion, and I got back the original integrand. What happened?

Answer: You could have made a mistake, but, more likely, you probably started with an integrand that was already in partial fraction form.

$$\text{e.g. } \frac{1}{(x^2+1)^2} \text{ and } \frac{3x+2}{(2x^2+5)^2}$$

are already in partial fraction form, and are ready to be integrated.

You would just be spinning your wheels if you worked out a partial fraction expansion.