

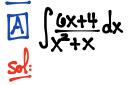


- We will consider integrals involving RATIONAL EXPRESSIONS of the form P(x)/Q(x), where P(x) and Q(x) are Polynomials (with the degree of P(x) less than the degree of Q(x))
- STEP 1: FACTOR the denominator fully
- **STEP 2**: Determine the FORM of the PARTIAL FRACTION decomposition depending on the types of factors in denominator. We will deal with two cases:
 - Distinct LINEAR Factors:
 - Distinct, irreducible **QUAPRATIC** Factors:
- **STEP 3** : Solve for the UNKNOWN PARAMETERS. Multiply both sides of equation by the denominator, then make judicious choices for x (see example!)

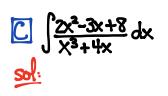
STEP 4: With the new <u>simplified</u> form, you can proceed to <u>INTEGRATE</u>. If all went accordingly you should be able to apply substitution or use arctan rule.



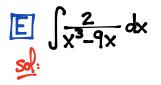
 $\mathbf{E}_{\mathbf{X}}$]. Compute the following integrals using PARTIAL FRACTION DECOMPOSITION.



 $\mathbb{B}\int \frac{11x-2}{x^2-x-12} dx$ S



$$\int \frac{2x^{2} + 17x - 12}{x^{3} + 5x^{2} - 6x} dx$$
sol:



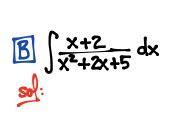
We can treat cases where the degree of P(x) is greater than or equal to the degree of Q(x) by using polynomial long division. This is beyond the scope of the course. Repeated factors can also be treated, but we will not cover that here.

PART 3: SMARTER NOT TRADER

 $\mathbf{E_{x2}}$. Compute the following integrals:

 $A \int \frac{dx}{x^2 + 4x + 7}$





•