# Factor by Grouping 

## Example 2

Factor $3 x^{3}-2 x^{2}+6 x-4$.
Solution

Working in pairs, factor out the greatest common factor for each pair of terms.

Factor ( $3 x-2$ ), which is common to both groupings.
Factoring is complete, since $\mathrm{X}^{2}+2$ cannot be factored further.
This method can certainly save time, but it will not work for every polynomial.

In order to use the method of grouping to factor a polynomial, the remaining factor from each grouping must be the same after the initial factoring has been completed.

## Consider :

Here the remaining factors $(x-1)$ and $(x-2)$ are not the same, so the next common factor step cannot be carried out.
This cubic cannot be factored by the grouping method.

A cubic polynomial of the form $\mathrm{ax}^{3}+\mathrm{bx}^{2}+\mathrm{cx}+\mathrm{d}$ can be factored by grouping if $\qquad$ .

## Example 3

Factor $\mathrm{x}^{5}+4 \mathrm{x}^{4}-2 \mathrm{x}^{3}-8 \mathrm{x}^{2}+\mathrm{x}+4$.

## Solution

