

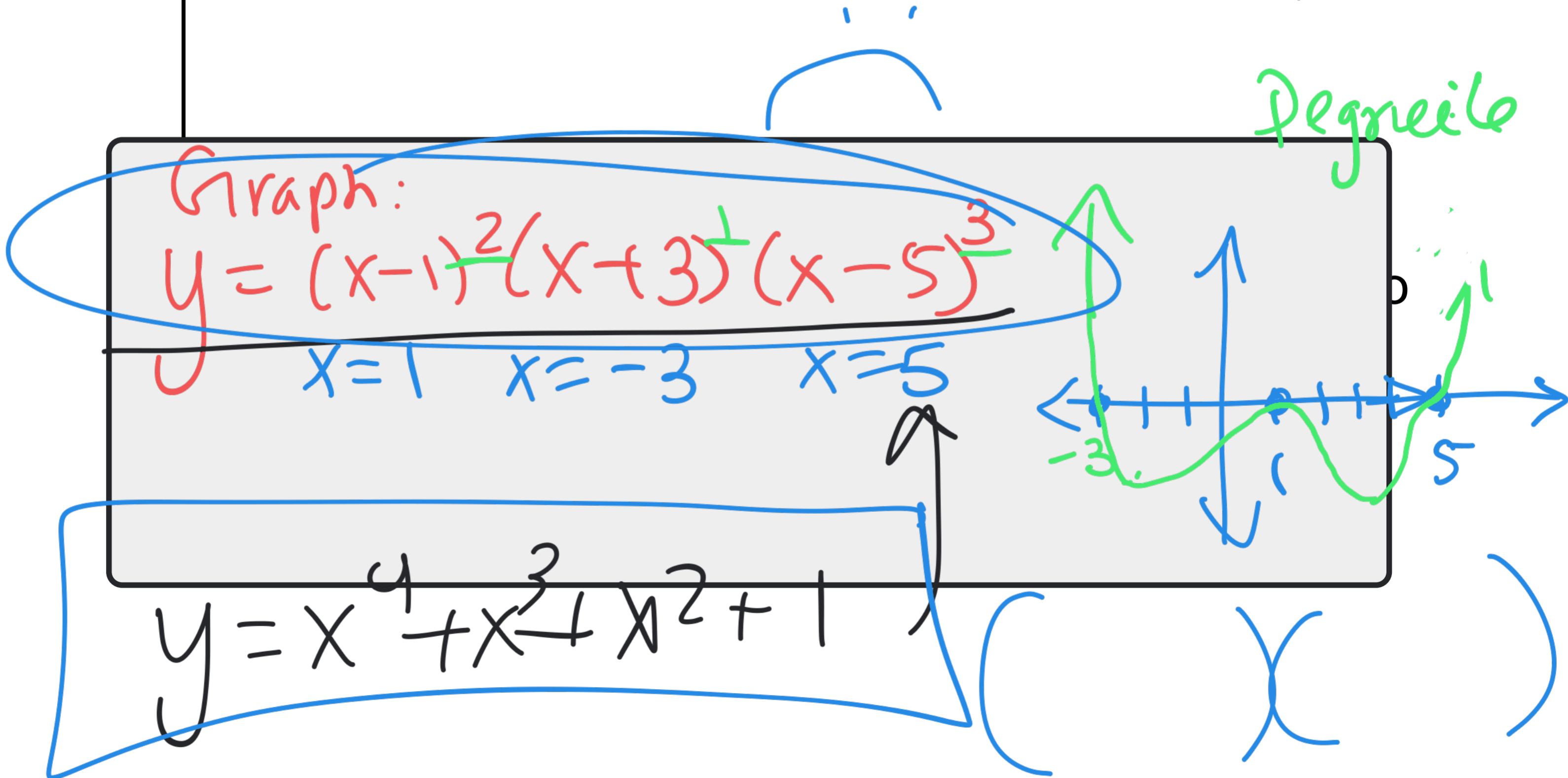
Unit 3
Module 6.4
Part 2

Factor Polynomials:
By Grouping

Assessment Friday

Learning Intentions:

Given a polynomial function students will be able to factor the polynomial by grouping.



Example

Factor the polynomial

$$x^3 + x^2 + x + 1$$

4 terms:
group

Check your work

$$(x+1)(x^2+1)$$
$$x^3 + x + x^2 + 1$$

$$x^3 + x^2 + x + 1$$

$$x^2(x+1) + 1(x+1)$$

$$(x+1)(x^2+1)$$

↑
common
Binomial

uncommon

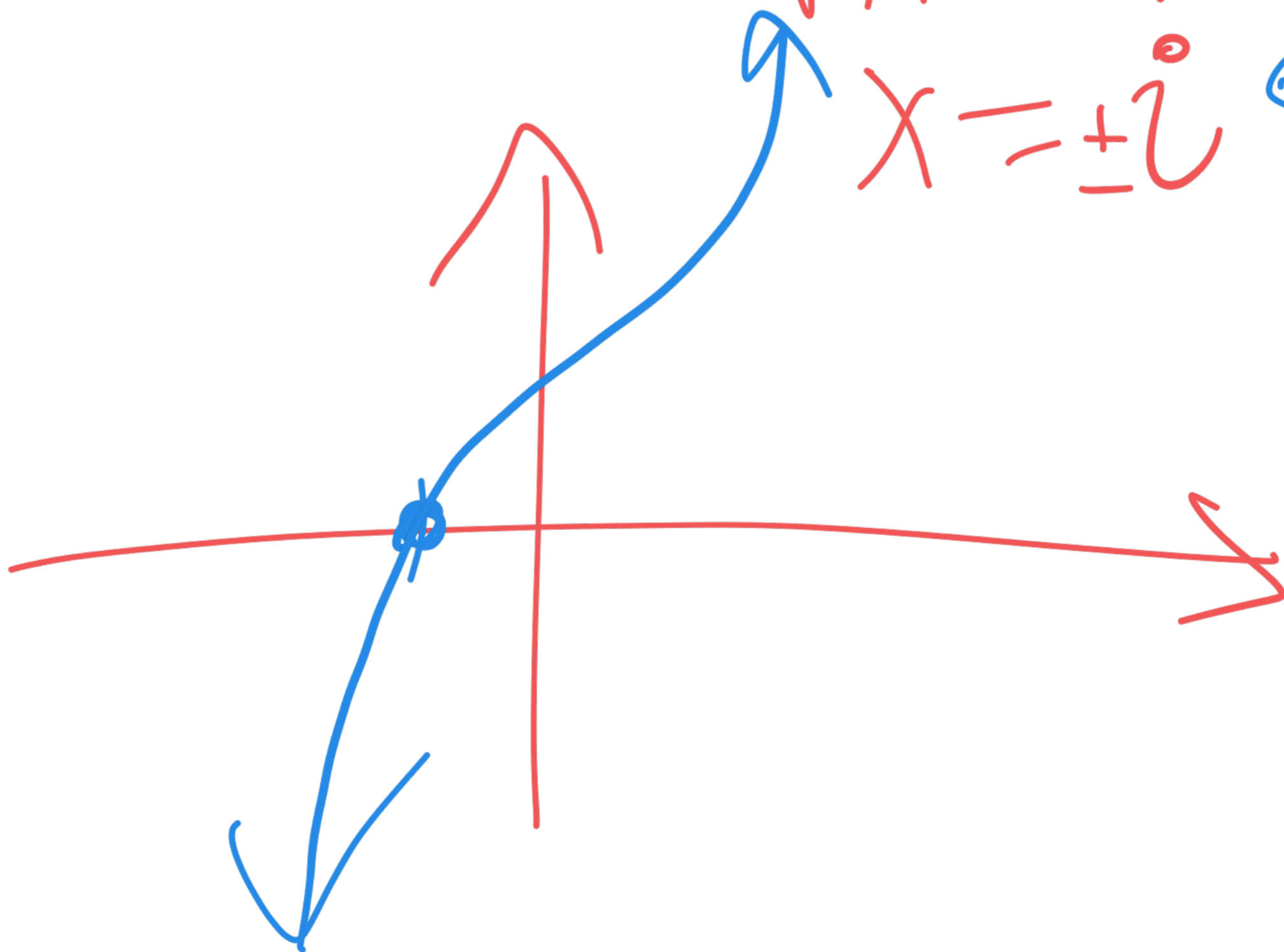
to Find zeros:
 $x+1=0$ $x^2+1=0$

$$\begin{array}{r} x+1=0 \\ -1 \quad -1 \\ \hline x=-1 \end{array}$$

$$\begin{array}{r} x^2+1=0 \\ x^2=-1 \end{array}$$

$$\sqrt{x^2} = \sqrt{-1}$$

$$x = \pm i$$



Example

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Factor the polynomial

$$\underline{3x^3 - 4x^2} + \underline{12x - 16}$$

$$x^2(3x-4) + 4(3x-4)$$

$$(3x-4)(x^2+4)$$

2 zeros:

$$\begin{array}{r} 3x-4=0 \\ +4 \quad +4 \\ \hline \end{array}$$

$$\begin{array}{r} x^2+4=0 \\ -4 \quad -4 \\ \hline \end{array}$$

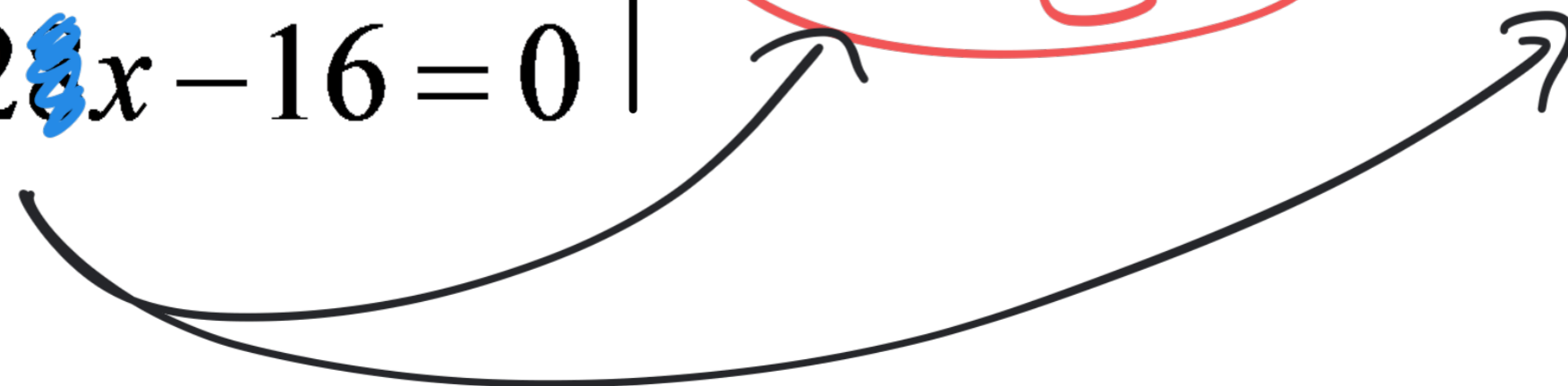
$$\frac{3x}{3} = \frac{4}{3}$$

$$x = \frac{4}{3}$$

$$\begin{array}{r} x^2 = -4 \\ \sqrt{x^2} = \sqrt{-4} \\ x = \pm 2i \end{array}$$

What are the zeros of the polynomial?

$$3x^3 - 4x^2 + 12x - 16 = 0$$



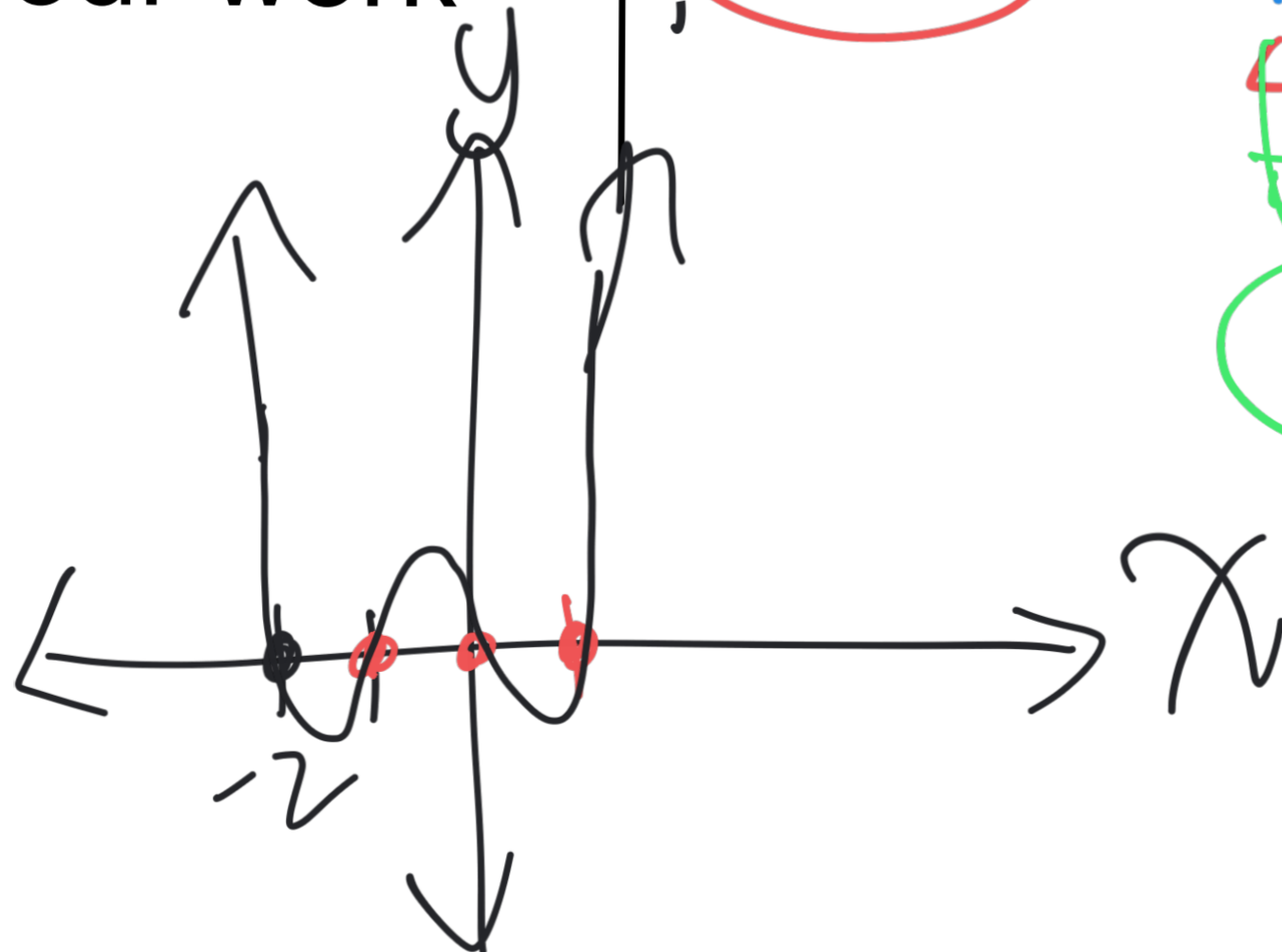
Example

Factor the polynomial

$$4x^4 + 8x^3 - 4x^2 - 8x$$

$$f(x) = 4x^4 + 8x^3 - 4x^2 - 8x$$

Check your work



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$$4x^3(x+2) - 4x(x+2)$$
$$(x+2)(4x^3 - 4x)$$

Find zeros:

$$x + 2 = 0$$

$$-2 \quad -2 \quad 4x^3 - 4x = 0$$

$$x = -2$$

$$4x(x^2 - 1) = 0$$

$$4x = 0 \quad x^2 - 1 = 0$$

$$x = 0$$

$$x^2 = 1$$

$$\sqrt{x^2} = \pm \sqrt{1}$$

$$x = \pm 1$$

When do you factor by grouping?

Why is factoring a polynomial function useful?