Aim: How can we factor more complicated polynomials expression using the difference of 2 squares, trinomial factoring, the sum of 2 cubes, or the difference of 2 cubes? (Section 5-6)

Do now: Find the roots of each equation by factoring or by using the quadratic formula

1) $x^2 – 4=0$

2) $x^2-2x+1=0$

3) $x^2+2x+2=0$

Question: How many roots did you find for each equation? How did the algebraic solution compares to the graphing (use your calculator to view the graph of each equation) solution?

I- The Fundamental Theorem of Algebra

take note

Theorem The Fundamental Theorem of Algebra

If $P(x)$ is a polynomial of degree $n \geq 1$, then $P(x) = 0$ has exactly n roots, including multiple and complex roots.

1- Every quadratic polynomial equation has two roots; every cubic polynomial equation has three roots, and so on…

2- Without using a calculator, find all the roots of each equation.

a) $x^3 – 5x^2 + x – 5 = 0$

Steps 1 – To use the Rational Root Theorem

Step 2 - To find at least one rational root.

Step 3 – To divided the rational root by P(x)

Step 4 – To continue to factor until you find all roots

b) $x^5 + 3x^4 – 8x^3 – 24x^2 – 9x – 27 = 0$

(Use your calculator to see all roots)

Aim: How can we factor more complicated polynomials expression using the difference of 2 squares, trinomial factoring, the sum of 2 cubes, or the difference of 2 cubes? (Section 5-6)

II- Exercises

take note

Concept Summary The Fundamental Theorem of Algebra

Here are equivalent ways to state the Fundamental Theorem of Algebra. You can use any one of these statements to prove the others.

- Every polynomial equation of degree $n \geq 1$ has exactly n roots, including multiple and complex roots.
- Every polynomial of degree $n \geq 1$ has n linear factors.
- Every polynomial function of degree $n \geq 1$ has at least one complex zero.

Find all the zeros of each function.

1. $y = x^3 - x^2 - 3x + 3$

To start, use a graphing calculator to find the possible rational roots.

2. $y = x^4 - 4x^3 + 7x^2 - 16x + 12$

3. $f(x) = x^3 + x^2 + 16x + 16$