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ABOUT THE ROOTS OF A POLYNOMIAL WITH A WHOLE COEFFICIENT

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ABSTRACT: This article shows sufficient conditions for some whole-coefficient polynomials not to have a whole root. The question of the roots of polynomials is a topical issue. Because there are no methods to find the exact values of the roots of a polynomial whose coefficients are real numbers.

KEYWORDS: polynomial, root of polynomial, Bezu theorem, Viet theorem.

INTRODUCTION

Many problems in mathematics are solved by solving some kind of equation. If equation $F(x)=0$ apparently, $F(x)$ if the whole coefficient is a polynomial, then the whole solutions of this equation $F(x)$ will be the roots of the polynomial It may also be that the whole root of such an equation does not exist.

Let's say $f(x)$ let the whole coefficient be a polynomial. Here are some comments on its entire roots.

Theorem 1. For three different whole numbers $|f(a)|=|f(b)|=|f(c)|=1$ if the equations are satisfied, then $f(x)$ many do not have whole roots.

THE MAIN FINDINGS AND RESULTS

Proof. Assume the opposite, that is $f(x)$ polynomial and a,b,c let the conditions of the theorem for numbers be satisfied, however $f(x)$ whole coefficient x_0 get the whole root. In that case according to Bezu's theorem $f(x)$ whole coefficient $x-x_0$ is divisible by a linear polynomial without a remainder, i.e., the remainder is equal to 0:

$$f(x)=(x-x_0)\varphi(x)$$

the polynomial here $\varphi(x)$ also has a whole coefficient. Using the condition of the theorem

$$|x-x_0||\varphi(x)|=1$$

$$|a-x_0||\varphi(a)|=|b-x_0||\varphi(x)|=|c-x_0||\varphi(x)|=1$$

we write the equations. Of these

$$|a-x_0|=|b-x_0|=|c-x_0|=1$$

arises.

So, $a-x_0$, $b-x_0$, $c-x_0$ indicates that at least two of the whole numbers are equal to each other. The latter conclusion contradicts the condition of the theorem.

Based on this proven theorem, the following theorem and results can also be proved.

Result 1, If $f(x)$ for whole coefficient $|f(a)|=|f(b)|=1$ if the equations are satisfied for two different integers, then $f(x)$ polynomial or whole coefficient.

Result 2, For a whole coefficient polynomial and different whole numbers $|f(a)|=|f(b)|=2$ if the equations are satisfied, then $f(x)$ whole coefficient $2<|x_0-a|$ ёки $|x_0-b|>2$ does not have whole roots that satisfy inequalities.

You can put an arbitrary prime number instead of the 2 prime numbers in the 2nd result.

3 results. If the whole coefficient $f(x)$ for polynomials and whole numbers $|f(a)|=1$ if equality is satisfied and $f(x)$ whole coefficient x_0 if it has a whole root, then either $x_0=a+1$ or $x_0=a-1$ equality is fulfilled.

CONCLUSION

$f(x)$ for a polynomial with a whole coefficient $|f(a)|=1$ condition $|x_0-a|>1$ the whole root that satisfies inequality x_0 will not be available.

Theorem 2. If $x^3+ax^2+bx+c=0$ is a polynomial with whole coefficients, c and if an odd number x_1,x_2,x_3 if s are the whole roots of this polynomial, then a and b the coefficients are also an odd number.

Results If $ax^2+bx+c=0$ the equation has a whole coefficient, if it has a rational root a,b,c at least one of the coefficients will be an even number.

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