Polynomial Equations

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Introduction

A polynomial is known as an expression that consists of two distinctive elements: variables and coefficients (Tanton, 2005). It is required to note that a polynomial equation contains a polynomial on both sides of the equation sign. Therefore, it is possible to see that there is a difference between the two terms, and the best way to get an idea of this is to represent them through examples:

- An example of a polynomial: x^2+2x+5
- An example of a polynomial equation: $0=x^2+2x+5$

Theoretical Background: Types of Polynomial Equations

This particular type of equation is also known as an algebraic equation. Knowledge about polynomials is crucial for anyone involved in mathematics or science—especially considering their popularity in a wide variety of disciplines such as chemistry, physics, social sciences, and even economics (Tanton, 2005). When speaking of the various types of equations, it is possible to state that they differ by the number of terms. For example, a binomial equation may look like $ax+b=0$ while a trinomial equation can look like $ax^2+bx+c=0$. Therefore, a general formula for a polynomial equation is like $a_0+a_1x+a_2x^2+...+a_nx^n=0$ (Rasiowa, 2014).

When speaking of a binomial equation that may look like $x^2-100=0$, the solution is simple, as it is possible to move *b* to the other side of the equation while reversing the sign of the value. This will result in $x^2=100$. As for the last step in solving this particular equation, it is required to remove the square from the root. In order to do so, it is required to take the square root on both sides, resulting in $\sqrt{x}=\sqrt{100}$ —thus leading to the solution: x=10. As for trinomial equations, they are constantly analyzed in the academic setting, so it is good to show the solving of the algorithm for them. A formula for the $ax^2+bx+c=0$ equation solution looks like this:

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$, which is referred to as the quadratic formula (Rasiowa, 2014).

Practical Example of a Polynomial Equation Solution

As it is possible to see, finding a root for this type of polynomial equation is simple, but there are different cases of the same pattern. In order to show the solving method in a more detailed fashion, you can solve the equation $x^2-x+56=0$ because it features a negative sign. So, this particular equation features *a*=1, *b*=-1, and *c*=56. It is possible to find the root of the equation by putting these values in the previously described formula, which will look like this:

$x=\frac{-(-1)\pm\sqrt{(-1)^2-4(1)(56)}}{2(1)}$.

After the calculations are done, the solving formula will be $x=\frac{1\pm\sqrt{-1}\sqrt{223}}{2}$.

However, this particular example is interesting, because it is known that a square root of a negative number equals *i*, which refers to an imaginary number. Due to the fact that there is nothing else to reduce in this equation, the solutions are: $x=\frac{1+i\sqrt{223}}{2}$ and $x=\frac{1-i\sqrt{223}}{2}$.

In conclusion, the algorithm for solving the most common type of polynomial equations is simple and universal. The example featured in this assignment is more complex due to the presence of square roots of negative numbers. However, it was decided to solve a particular equation in order to show that its solution may look different from the commonly perceived basic numbers. Finally, when it comes to the polynomial equations that feature more values, variables, and coefficients, the solution may require more steps, but they are usually simple in nature and require careful attention to the movement across the equation and changes in mathematical symbols.

References

Rasiowa, H. (2014). *Introduction to Modern Mathematics*. Elsevier.

Tanton, J. (2005). *Encyclopedia of Mathematics*. New York: Facts On File books.