OMEGA ACADEMY, NUMERICAL METHODS COURSE.

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Numerical Methods

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UNIT EIGHT

Polynomials roots.

The roots of a polynomial are the values that override the polynomial; a polynomial is a mathematical expression consisting of a finite set of variables and constants not determined. The functions or equations have a degree; the degree is the highest exponent of the equation.

Example I.

(Function Second Grade).

$$f(x) = x^2 - 5x + 6$$

Factorized

$$f(x) = (x-2)(x-3)$$

Then the solutions or roots of the polynomial are

$$x_0 = 2 \; y \; x_1 = 3$$

Replacing x0 and x1 will check the function

$$f(2) = 2^2 - 5(2) + 6$$

$$f(2) = 4 - 10 + 6$$

$$f(2) = 0$$

$$f(3) = 3^2 - 5(3) + 6$$

$$f(3) = 9 - 15 + 6$$

$$f(3) = 0$$

Example 2 (Function Fourth Grade):

$$f(x) = x^4 - 11x^3 + 41x^2 - 61x + 30$$

Synthetic division is made; the coefficient of the variables are taken

1	− 11	41	− 61	30	
	5	− 30	55	− 30	
1	− 6	11	− 6	0	5
	3	− 9	6		
1	− 3	2	0	3	

$$f(x) = (x^2 - 3x + 2)(x - 3)(x - 5)$$

$$f(x) = (x - 1)(x - 2)(x - 3)(x - 5)$$

The solutions or roots of the polynomial are:

$x_0 = 1, x_1 = 2, x_2 = 3$ y $x_3 = 5$

It is found by replacing the x in the function

$$f(1) = (1)^4 - 11(1)^3 + 41(1)^2 - 61(1) + 30$$

$$f(1) = 1 - 11 + 42 - 61 + 30$$

$$f(1) = 72 - 72$$

$$f(1) = 0$$

$$f(2) = (2)^4 - 11(2)^3 + 41(2)^2 - 61(2) + 30$$

$$f(2) = 16 - 88 + 164 - 122 + 30$$

$$f(2) = 210 - 210$$

$$f(2) = 0$$

$$f(3) = (3)^4 - 11(3)^3 + 41(3)^2 - 61(3) + 30$$

$$f(3) = 81 - 297 + 369 - 183 + 30$$

$$f(3) = 480 - 480$$

$$f(3) = 0$$

$$f(5) = (5)^4 - 11(5)^3 + 41(5)^2 - 61(5) + 30$$

$$f(5) = 625 - 1375 + 1025 - 305 + 30$$

$$f(4) = 1680 - 1680$$

$$f(4) = 0$$