Cubic Functions

You have studied linear functions and monomials. Some functions can be defined by the sums of monomials. One function that can be defined this way is a cubic function. A **cubic equation** has the form $ax^3 + bx^2 + cx + d = 0$, where $a \neq 0$. All cubic equations have at least one but no more than three real roots. You can graph cubic functions using a Casio FX-9750G graphing calculator.

ACTIVITY

Solve $x^3 - 6x^2 + 3x + 10 = 0$ by graphing.

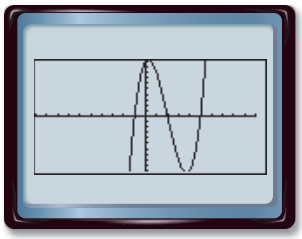
Clear the memory before starting. Select MEM from the main menu, ▼ Reset F1 MENU 5.

Step 1 Enter the related function in the Graph Func list.

KEYSTROKES: X,θ,T ^ 3 − 6 X,T,θ x^2 + 3 X,θ,T + 10 EXE

Step 2 Graph the function in the standard viewing window.

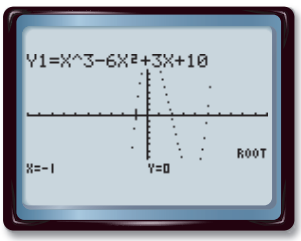
KEYSTROKES: SHIFT [V-Window] F3 EXE F6



[−10, 10] scl: 1 by [−10, 10] scl: 1

Step 3 Find the zeros of the function by determining where the graph crosses the x-axis. Notice that this graph crosses the x-axis three times. Therefore, there are 3 real solutions for the equation.

KEYSTROKES: SHIFT [G-Solv] F1



One root is $x = -1$.

Step 4 Press ▶ to find the second root. Repeat to find the third root.

The solutions for $x^3 - 6x^2 + 3x + 10 = 0$ are $x = -1$, 2, and 5.

Exercises

Solve each equation by graphing.

1. $x^3 - 4x^2 - 9x + 36 = 0$
2. $x^3 - 6x^2 - 6x - 7 = 0$
3. $x^3 + x^2 + x - 3 = 0$
4. $x^3 - 5x^2 - 2x + 24 = 0$