Rearrangement Method

Method and Example

This method will find an interval in which the root lies.

The first intention is to find a root of the equation: \( f(x) = x^5 - 5x + 3 = 0 \)

This can be rearranged into the form \( x = g(x) \), where \( g(x) = \frac{x^5 + 3}{5} \)

When put on a graph with \( y = x \), the two graphs should intersect. Below are the roots of the equation \( f(x) = 0 \).

This gives the iterative formula: \( x_{n+1} = \frac{x_n^5 + 3}{5} \). When \( x_0 = 0 \), the iterative formula produces the following values:

<table>
<thead>
<tr>
<th>( x_n )</th>
<th>0</th>
<th>0.6</th>
<th>0.61555</th>
<th>0.61767</th>
<th>0.61798</th>
<th>0.61803</th>
</tr>
</thead>
</table>

The function \( g(x) \) converges on the graph \( y = x \) at 0.61803, this is a root of the equation \( x^5 - 5x + 3 = 0 \).