Polynomial algebra, roots and bisection

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A sample from this topic. The complete topic collection contains three different resources and worked solutions.

Read the worked example, then show each step in the practice questions. Attempt the reasoning and exact calculations by hand. Technology may check a result but cannot replace the written argument.

What you will practise

• Polynomial equations; factor, remainder and rational root theorems; bisection

Useful starting skills: Year 10 algebra, factorisation, functions, indices, geometry and elementary probability.

A root r of polynomial P gives a factor x-r. The remainder on division by x-r is P(r), so substitution tests a proposed factor.

Bisection repeatedly halves a bracket whose endpoint values have opposite signs for a continuous function. It gives an interval containing a root, not an exact symbolic root in general.

Worked example

Factor $P(x)=x^3-4x$ and find all real roots.

Factor out x, then use difference of squares.

Answer: $x(x-2)(x+2)$; roots $-2, 0, 2$.

Try it yourself

Name: _____ Date: _____

1. Find remainder when x^3+2x-7 is divided by $x-2$.

2. Factor $x^3-6x^2+11x-6$.

Answers and explanations

Check the method as well as the final answer. An alternative correct method is also valid.

1. 5.

Evaluate P(2)=8+4-7.

2. (x-1)(x-2)(x-3).

Testing 1, 2, 3 gives zeros; the monic cubic is their factor product.

Curriculum reference: Mathematical Methods Units 1–2 — Polynomial equations; factor, remainder and rational root theorems; bisection

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