Algorithms and simulations

Learn and practise | Free preview

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

Read the explanation and worked example. Show your working; use a calculator only where asked.

What you will practise

• Design numerical algorithms and simulations with explicit accuracy and assumptions.

• Explain a method and check the reasonableness of a result.

Useful starting skills: Use the prerequisite operations and representations shown in the worked example.

An algorithm specifies valid inputs, repeatable steps and a stopping rule. Numerical methods approximate a result; verify them with cases whose answers are known.

A simulation models random behaviour. Define the distribution, independence assumptions and event of interest, then estimate probability using many repeated trials.

Worked example

Use bisection for $\sqrt{2}$ on$[1,2]$.

Midpoint 1.5 has square 2.25, so retain$[1,1.5]$.

Next midpoint 1.25 has square 1.5625, so retain$[1.25,1.5]$.

Answer: After two steps:$1.25<\sqrt{2}<1.5$

Try it yourself

Name: _____ Date: _____

1. Find midpoint of[2,3].

2. After 5 bisections of width 1, find bracket width.

Answers and explanations

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

1. 2.5

Average endpoints.

2. 1/32

Each step halves the width.

Curriculum reference: VC2M10AA02

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