Sequencing, decisions and repetition

Key knowledge | Free preview

Learning target: Understand how ordered operations, branches and loops control technological algorithms and simulations.

An implemented algorithm relies on correctly ordered instructions, decisions and repetition. Initialisation establishes a valid starting state; branches choose the next action; a stopping rule connects the process to an accuracy target. Trace several steps before trusting a full run, and record a limit or error condition so a failed calculation does not silently continue.

Try the mathematics

Task 1. Implement the following Newton iteration outline for $f(x)=x^3-7$ and explain the purpose of its initialisation, decision and repetition: Set $x=2$ and a maximum of 20 iterations. At each step, compute $d=3x^2$; if $d=0$, stop with a different-start warning. Set $next=x-(x^3-7)/d$. Record next and its residual. Stop when both $|next-x|<10^{(-8)}$ and $|next^3-7|<10^{(-8)}$; otherwise replace x by next and repeat.

Continue with the full worksheet

The complete resource has 2 focused task sets and substantive worked solutions. Use an exercise book or print the A4 worksheet. This preview shows the first task without its full solution.

Find this resource: https://resources.aspiretopowerlearning.com.au/vce/skills/aspire-mm-u2-o3-kk-07/

Study-design reference

VCE Mathematics Study Design 2023-2027, version 1.1 (November 2022). Mathematical Methods; Unit 2; Outcome 3; Key knowledge; bullet 7; p. 56.

The learning target is a concise paraphrase. Aspire reference: aspire-mm-u2-o3-kk-07. This is an internal identifier, not an official VCAA code.

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