Circulatory models and parameter identifiability — review sheet

Use this after attempting the worked examples and practice. Explain each claim in words before calculating.

Key ideas

- Question and observable determine useful resolution.
- The six-region boundary represents a closed circulation, not six anatomical heart chambers.
- Mean flow is a product under the stated repeated-cycle assumption.
- Equal outputs can arise from different hidden parameters.
- Verification and validation answer different questions.

Common errors and repairs

Inferring a unique internal mechanism from one successful fit. Look for transformations that leave the observable unchanged and identify additional measurements.

Using a pressure gauge shift as if it were a change of transmural loading. Track the exterior pressure and the storage relation too.

Retrieve without your notes

- What converts rate times stroke volume from mL/min to L/min?
- Can a more detailed model remove missing measurement information by itself?

Readiness check

- Trace the two-pump circulation and justify a six-region lumped boundary.
- Map three scientific questions to assumptions, model resolution and measurable outputs.
- Calculate mean flow and effective resistance with compatible units.
- Demonstrate a non-identifiable parameter pair and select an additional observation.
- Distinguish numerical verification, parameter estimation and experimental validation.