Image coordinates, pixel-cell meshes and geometric sensitivity — review sheet

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

Key ideas

- Physical geometry depends on spacing, origin, direction and index convention.
- Pixel-cell triangulation can be verified exactly for a fixed mask.
- Threshold, resampling and mesh refinement are different interventions.
- Provenance supports reproducibility; independent evidence supports anatomical validation.

Common errors and repairs

Use row/column directly as x/y. Write the explicit [column,row] geometric vector and apply spacing before direction.

Take an equal-area diameter as an anatomical width. It is one scalar summary; retain local features and topology.

Describe the 2D mesh as a completed CFD model. State the missing domain, boundary, material and solver ingredients.

Retrieve without your notes

- How does doubling both spacings affect area?
- Which check can an origin error evade?
- What does a hash fail to establish?

Readiness check

- Map a row/column location into physical coordinates with units.
- Construct a conforming triangular mesh of a synthetic foreground mask and verify its area.
- Separate threshold sensitivity from mesh refinement and from validation against anatomy.
- Record enough provenance to reproduce the image-to-geometry calculation.