Lean pre-coding sheet — 75/89  
**Component:** tests/vm\_tst\_gates.rs (legitimacy gates)

1. Goal & success

**Goal.** Verify legitimacy gates and their fixed denominators: quorum, national majority/supermajority, double-majority (national + affected-region family), and symmetry — plus pipeline stop/continue behavior when a gate fails.

**Success.** For canonical gates fixtures (VM-TST-004/005/006/007), the engine returns the specified Pass/Fail per gate and final label, using the **approval-rate** denominator when ballot\_type = approval.

1. Scope

**In:** Gate math & thresholds (VM-VAR-020..027), fixed approval-rate rule, symmetry neutrality, Invalid path semantics.  
**Out:** Ranked method details (covered in vm\_tst\_ranked.rs), MMP, frontier mapping visuals (unless indirectly referenced).

1. Inputs → outputs

**Inputs.** Gates fixtures from Annex B (registries, tallies, parameter sets). Defaults: quorum 50; national majority 55; regional 55; double\_majority\_enabled = on; symmetry\_enabled = on; weighting population\_baseline.

**Outputs (assert).** Gate panel entries (quorum / majority / double-majority / symmetry) and final label; where relevant, exact printed comparisons (e.g., “Support 55.0% vs 55% — Pass”).

1. Entities/Tables (minimal)

(N/A)

1. Variables (used here)

* **VM-VAR-020** quorum\_global\_pct ∈ % 0..100 (default 50)
* **VM-VAR-021** quorum\_per\_unit\_pct ∈ % 0..100 (default 0)
  + **VM-VAR-021\_scope** ∈ {frontier\_only, frontier\_and\_family} (only relevant if 021 > 0)
* **VM-VAR-022** national\_majority\_pct ∈ **% 50..75** (default 55)
* **VM-VAR-023** regional\_majority\_pct ∈ **% 50..75** (default 55)
* **VM-VAR-024** double\_majority\_enabled ∈ {on, off} (default on)
* **VM-VAR-025** symmetry\_enabled ∈ {on, off} (default on)
* **VM-VAR-026** affected\_region\_family\_mode ∈ {by\_list, by\_tag, by\_proposed\_change}
* **VM-VAR-027** affected\_region\_family\_ref (list of Unit IDs or a tag; required for by\_list/by\_tag)
* **VM-VAR-029** symmetry\_exceptions (optional list/tag with rationale)
* **VM-VAR-007** include\_blank\_in\_denominator ∈ {on, off} (default off)

**Fixed rule (not a variable):** For **approval** ballots, legitimacy support % uses **approval rate** = approvals\_for\_change / valid\_ballots. (There is **no** gate\_denominator\_mode variable.)

1. Functions (test signatures only)

#[test] fn vm\_tst\_004\_supermajority\_edge\_ge\_rule();

#[test] fn vm\_tst\_005\_quorum\_failure\_invalid();

#[test] fn vm\_tst\_006\_double\_majority\_family\_fail();

#[test] fn vm\_tst\_007\_symmetry\_mirrored\_pass();

1. Test logic (bullet outline)

* **VM-TST-004 (≥ edge):** Approval ballots with exactly **55.000%** valid approvals for Change; quorum met → **Pass**, label **Decisive**; panel prints “Support 55.0% vs 55% — Pass”.
* **VM-TST-005 (quorum fail):** Turnout **48%** (Σ ballots\_cast / Σ eligible\_roll) → **Invalid (Quorum failed)**; omit Frontier.
* **VM-TST-006 (DM regional fail):** National **57%** (Pass) but affected-family **53%** (<55) → **Invalid**, reason “Regional threshold not met”; when frontier\_mode = none, require affected\_region\_family\_mode ∈ {by\_list, by\_tag} **and** non-empty affected\_region\_family\_ref.
* **VM-TST-007 (symmetry):** Mirrored A→B and B→A scenarios at **56%** both **Pass** with identical thresholds/denominators; only labels differ by option names.

1. State flow (very short)

On gate **Fail**, run is **Invalid**, skip **MAP\_FRONTIER**, then label & build outputs. Mirrored runs must share denominator choices.

1. Determinism & numeric rules

Approval-rate is fixed: approvals\_for\_change / valid\_ballots.  
Turnout uses eligible\_roll.  
Cutoffs use **≥** comparisons.  
Stable ordering and canonical JSON elsewhere.

1. Edge cases & failure policy

* If double\_majority\_enabled = on and frontier\_mode = none but affected\_region\_family\_mode = by\_proposed\_change ⇒ **validation error** — switch to by\_list or by\_tag and provide a **non-empty** reference.
* If **symmetry exceptions** (VM-VAR-029) are present: mark “Symmetry: Not respected” with rationale; tests here expect symmetry to be respected (no exceptions).

1. Test checklist (must pass)

* **004:** Majority **Pass** at **55.0%** (edge).
* **005:** **Invalid** due to **Quorum failed** at **48%**.
* **006:** **Invalid** with regional **Fail** (min 53%).
* **007:** Both mirrored runs **Pass** with identical denominator/threshold handling.