**Comprehensive metrics**

* We report **ROC-AUC, PR-AUC, F1, precision, recall, accuracy** at the **F1-tuned threshold** (val-optimized, tested on holdout). Curves and confusion matrices are exported to ./reports/ and summarized in the PDF.

**Business-focused interpretation (what the model is telling you)**  
From permutation importance/coefficients (and consistent with EDA):

* **Contract** (Month-to-month ↑ churn risk vs 1-/2-year)
* **Tenure** (shorter tenure ↑ churn)
* **MonthlyCharges** (higher current bill ↑ churn)
* **Security/Support depth** (security\_support\_count ↓ churn)
* **PaymentMethod** (Electronic check ↑ churn)
* **InternetService** (Fiber users show ↑ churn relative to DSL)  
  These are the levers to target: move customers to longer contracts, bundle support/security add-ons, reduce pain points for higher bills, nudge away from electronic check to autopay.

**Model limitations**

* **Static snapshot**: no temporal sequences (e.g., recent tickets, price changes), so causality is limited.
* **Calibrated probabilities**: LR is usually well-calibrated; RF/SVM may need **Platt/Isotonic** if you need calibrated uplift tactics.
* **Data coverage**: features are product/plan heavy; we lack NPS, SLA breaches, or service quality KPIs that could shift behavior.

**Potential improvements**

* Try **XGBoost/CatBoost** (handles categoricals/monotonic constraints well).
* Add **calibration** for tree/SVM if deploying those.
* Add **tenure splines** or **log transforms** for linear models, and selective interactions (e.g., Fiber × ElectronicCheck).
* Collect **service quality** and **support ticket** stats; add **recency** features (e.g., billing disputes in last 30 days).