# FROM PROBABILITIES TO LABELS: ROC CURVE

Remember: Both probabilistic and scoring classifiers can output classes by thresholding:

$$h(\mathbf{x}) = [\pi(\mathbf{x}) \geq c] \quad \text{or} \quad h(\mathbf{x}) = [f(\mathbf{x}) \geq c_f].$$

**To draw a ROC curve**:

1. Rank test observations on decreasing score.
2. Start with $c = 1$, so we start in $(0, 0)$; we predict everything as negative.
3. Iterate through all possible thresholds $c$ and proceed for each observation $x$ as follows:
   - If $x$ is positive, move TPR $1/n_+$ up, as we have one TP more.
   - If $x$ is negative, move FPR $1/n_-$ right, as we have one FP more.