Math 150, Spring 2023
Jo Hardin
WU # 12
Tuesday, 2/28/2023

Your Name: _____

Names of people you worked with: _____

1. It should or should not snow in Claremont?
2. When is Exam 1?
3. On the plot (or feel free to sketch your own plot with a pencil), label the following points (A through H) representing different cutoffs for "success".

A Using 0.25 as the cutoff (any observed value with a predicted probability of success gets labeled "success" in terms of predicted value):

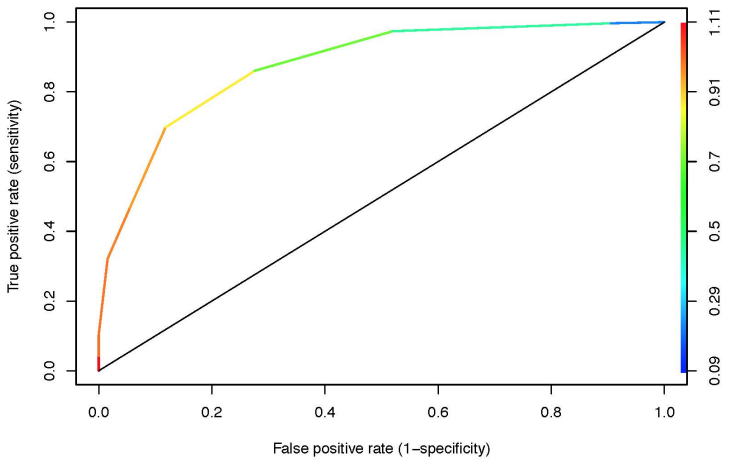
		truth	
		yes	no
predicted	yes	300	66
	no	8	61

B Using 0.7 as the cutoff:

		truth	
		yes	no
predicted	yes	265	35
	no	43	92

C Using 0.9 as the cutoff:

		truth	
		yes	no
predicted	yes	144	7
	no	164	120



D Using probability 1 as the cutoff.

E Using 0 as the cutoff.

F A model which predicts perfectly.

G Random guessing.

H Worse than random guessing.

3. **Solution:**

A

$$\begin{aligned} \text{sensitivity} &= TPR = 300/308 = 0.974 \\ \text{specificity} &= 61/127 = 0.480, 1 \text{ - specificity} = FPR = 0.520 \end{aligned}$$

B

$$\begin{aligned} \text{sensitivity} &= TPR = 265/308 = 0.860 \\ \text{specificity} &= 92/127 = 0.724, 1 \text{ - specificity} = FPR = 0.276 \end{aligned}$$

C

$$\begin{aligned} \text{sensitivity} &= TPR = 144/308 = 0.467 \\ \text{specificity} &= 120/127 = 0.945, 1 \text{ - specificity} = FPR = 0.055 \end{aligned}$$

D all models will go through (0,0) → predict everything negative, prob=1 as your cutoff

E all models will go through (1,1) → predict everything positive, prob=0 as your cutoff

F you have a model that gives perfect sensitivity (no FN!) and specificity (no FP)

G random guessing. If classifier randomly guess, it should get half the positives correct and half the negatives correct. If it guesses 90% of the positives correctly, it will also guess 90% of the negatives to be positive.

H worse than random guessing. Note that the opposite classifier to (H) might be quite good!