

DS 102 Discussion 1

Monday, August 30, 2021

1. **Definitions.** In the first lecture, we discussed binary decision making. The results of binary decisions can be summarized by the 2×2 table below:

		Decision	
		0	1
Reality	0	TN	FP
	1	FN	TP

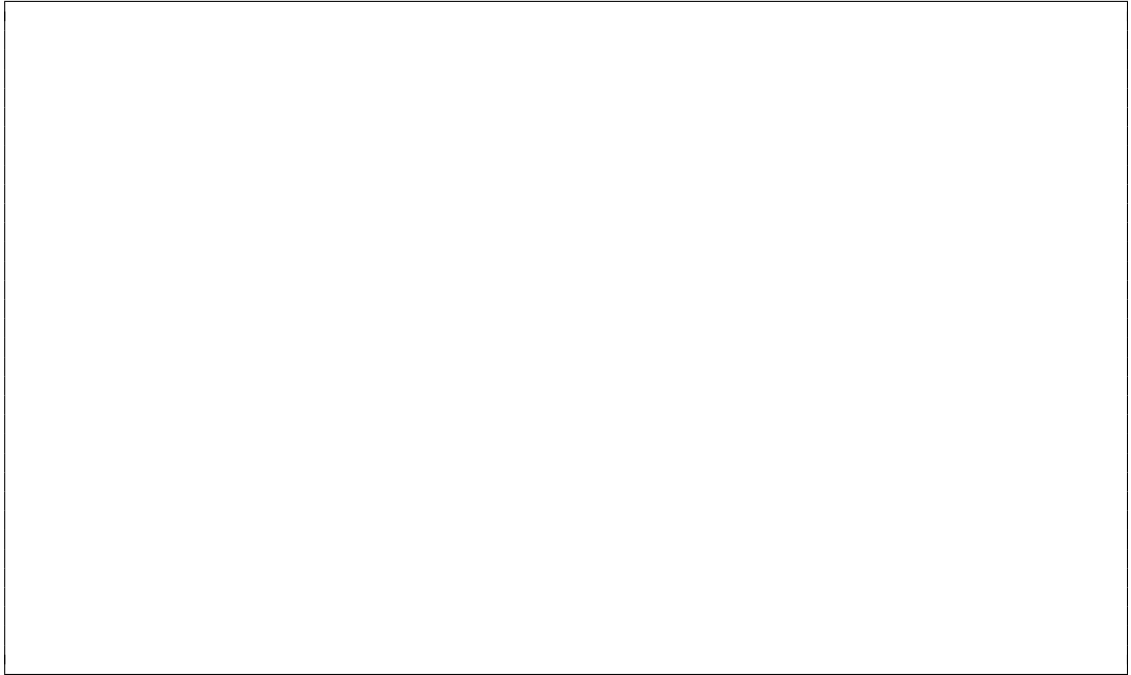
Figure 1: **Consequences of Binary Decisions**

In this table, the first letter of each acronym represents whether the model made a correct decision and the second letter represents the class of the label. For example, “TP”, or “true positives”, are instances where the model made a positive decision and the label was positive.

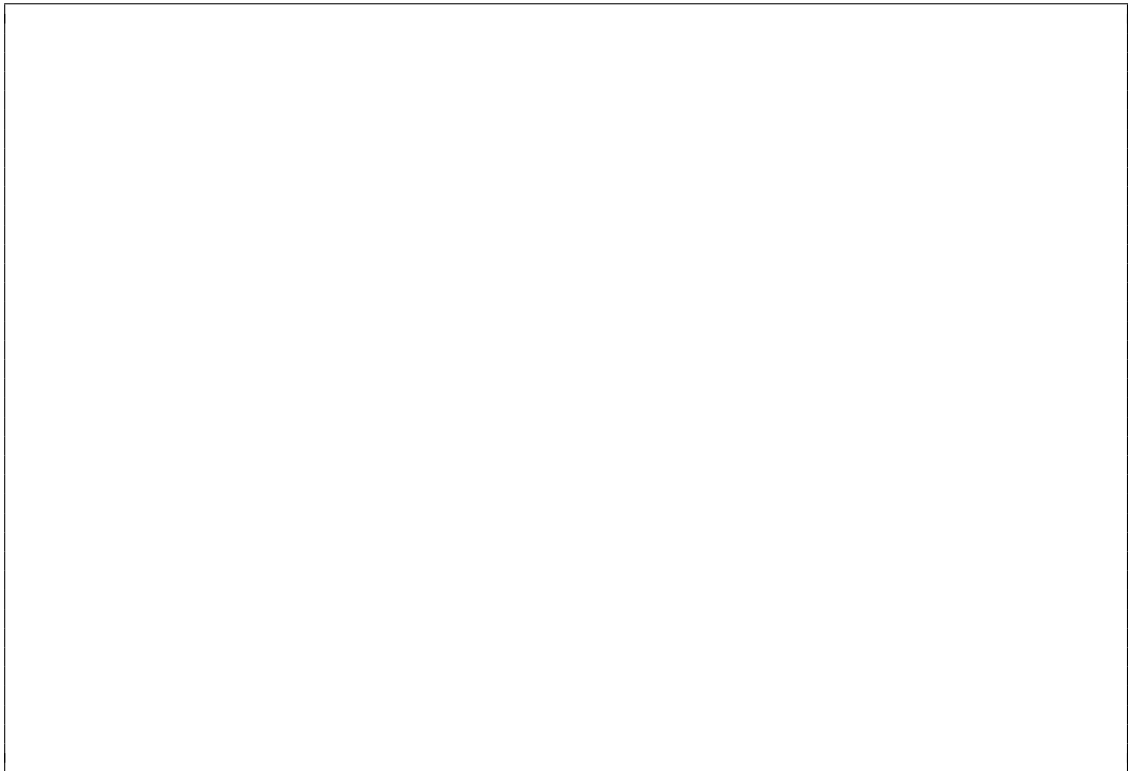
Indicate whether each of the following statements are **True** or **False**.

1. $FPR = 1 - TPR$, where FPR and TPR are the False Positive Rate and True Positive Rate respectively.

2. The False Discovery Proportion (FDP) can be thought of as a conditional probability that the reality is null ($R = 0$), given that we made a discovery ($D = 1$).



3. Define the False Omission Rate (FOR) to be $\frac{FN}{FN+TN}$. This is a column-wise rate.



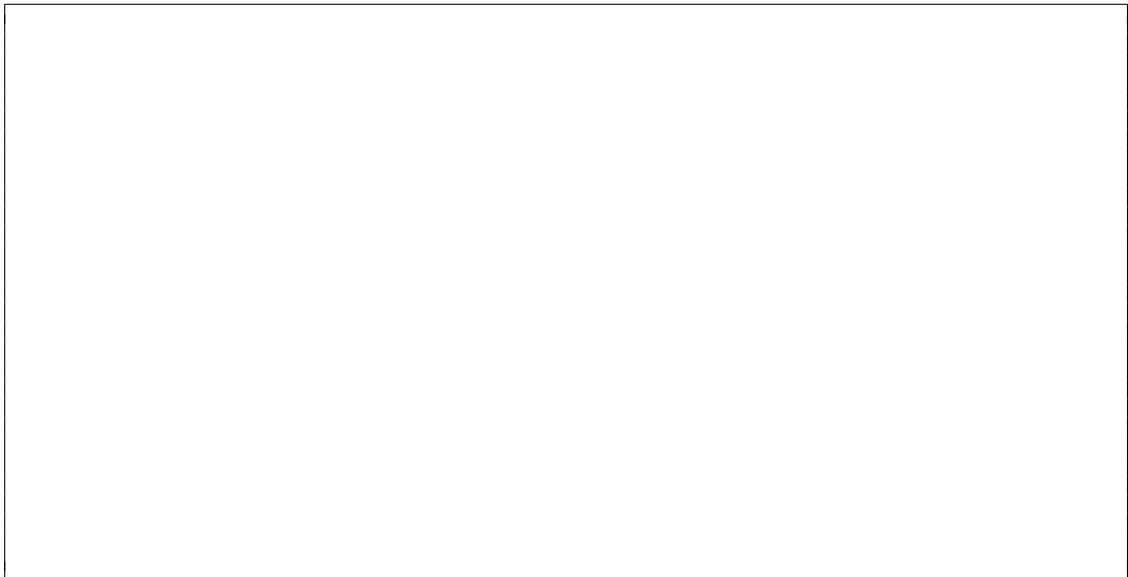
2. **COVID-19 Testing.** The Abbott 15-Minute COVID Test has a sensitivity of 97.1% and a specificity of 98.5%.

Note: Throughout this question, we will use real data from the NY Times Interactive Coronavirus Tracker.

- (a) In Alameda County, the cumulative rate of COVID cases as of 1/17/2021 was reported to be 4032 per 100,000 people. Assuming this was the true prevalence of the disease, what would the FDP for Abbott 15-Minute tests be?



- (b) The current rate of new COVID cases in Alameda County is reported to be 25 per 100,000 people. Assuming this is the true prevalence of the disease, what would the FDP for Abbott 15-Minute tests conducted now be?



- (c) Compare the FDPs calculated in 2(a) and 2(b). How does prevalence affect FDP? What other assumption(s) do we make when we compute FDP in 2(a) and 2(b)?

3. **FDP vs. FOR.** Can you think of examples where the False Omission Rate (FOR) is more important than the False Discovery Rate (FDR)? When is the FDR more important than the FOR?

