1 True or False (8 Pts)

For each of the following, determine whether the statement is true or false.

If requested, you should explain your answer in 1-2 sentences. If not requested, no work or explanations will be graded.

(a) [1 Pt] A scientist plans to look for 10 different trends in a dataset. They will report any trend that is significant relative to its null. They do not report negative results. **Claim:** The scientist should adopt a 0.5% significance threshold to ensure that, if all the nulls were true, then the probability they falsely report any trend is less than 5%.

● **True** ○ False

(b) [2 Pts] A materials science lab is testing candidate materials for carbon capture. They plan to use two rounds. In the first round, they will rapidly iterate over many candidates to identify promising materials for more thorough testing. In the second, they will intensively test promising candidates. **Claim:** In the first round of testing the lab should prioritize FWER over FDR. *Explain your answer in two sentences or less.*

○ True ● **False**

Explanation:

> **Solution:** Since they're going to remove any potential false positives in a subsequent round, it's better to optimize for FDR rather than the more conservative FWER, since this makes it more likely they won't accidentally throw out any promising candidates in the first round due to a too-strict threshold.

(c) [1 Pt] The ROC curve associated with a particular test illustrates the trade-off between FPR and TPR over all possible significance thresholds.

● **True** ○ False

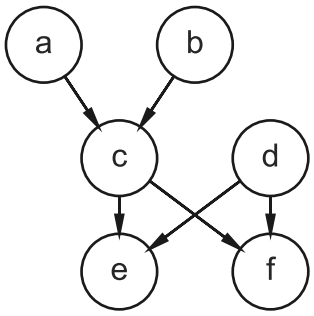
(d) [1 Pt] The posterior risk is the expected loss averaged over all possible unknowns that determine the data-generating process, given the observed data.

● **True** ○ False

(e) [1 Pt] In a generalized linear model with a sigmoid inverse link function, the features must always be between 0 and 1.

○ True ● **False**

Parts (f) and (g) refer to the following graphical model:



(f) [1 Pt] a and d are independent.

● **True** ○ False

(g) [1 Pt] c and d are conditionally independent given f.

○ True ● **False**