

# Lab 1: Probability Exercises

---

1. Prove Bayes rule:

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

2. For each of the following statements, either prove it is true or show that it isn't true through a counterexample:

- a.  $P(A=\text{true}|B=\text{true}) + P(A=\text{false}|B=\text{true}) = 1$
- b.  $P(A=\text{true}|B=\text{true}) + P(A=\text{true}|B=\text{false}) = 1$
- c. If  $P(A | B, C) = P(B | A, C)$  then  $P(A | C) = P(B | C)$
- d. If  $P(A | B, C) = P(A)$  then  $P(B | C) = P(B)$