<u>Example 1: separation holds, but not sufficiency</u>
Let C = Hypertension, Y = Hyperlipidemia, and A = Gender

Want to prove:
P(Hypertension | Hyperlipidemia, Gender) = P(Hypertension | Hyperlipidemia)

P(Hypertension | Hyperlipidemia, Gender) =
[0.5560581928250615, 0.4439418071749385]

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[0.5560581928250615, 0.4439418071749385]

Since LHS == RHS, separation holds

Want to prove:
P(Hyperlipidemia |Hypertension, Gender) != P(Hyperlipidemia | Hypertension)

P(Hyperlipidemia |Hypertension, Gender) =
[0.5001088390530728, 0.4998911609469271]

P(Hyperlipidemia | Hypertension) =
[0.4639580370746129, 0.5360419629253871]

Since LHS != RHS, sufficiency doesn't hold
Thus, separation holds, but not sufficiency

Example 2: sufficiency holds, but not separation
Let C = Hyperlipidemia, Y = Hypertension, A = Gender

Want to prove:
P(Hyperlipidemia |Hypertension, Gender) != P(Hyperlipidemia | Hypertension)

P(Hyperlipidemia |Hypertension, Gender) =
[0.5001088390530728, 0.4998911609469271]

P(Hyperlipidemia | Hypertension) =
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Since LHS == RHS, sufficiency holds.
Thus, sufficiency holds, but not separation.