1.3

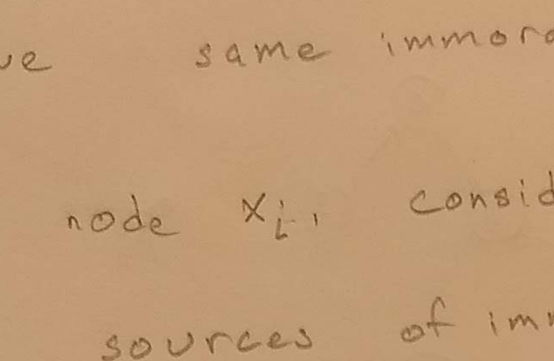
c) ii. Earlier part (i) showed that if G_1 & G_2 I-equivalent $\Rightarrow$ G_1 & G_2 have same skeleton

Claim: Suppose G_1 & G_2 are I equivalent. Here I show G_1 & G_2 must have same immoralities

Proof: For each node X_i, consider its Markov boundary X_{B_i}. There are 2 sources of immoralities

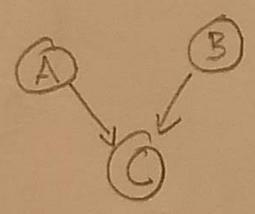
1. Multiple parents
2. Children w/ other additional parents

e.g.



Changing direction of parents induces conditional indep & removes pairwise indep $\Rightarrow$ violating I-equivalence

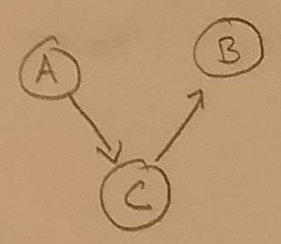
e.g. Before



$A \perp\!\!\!\perp B$

$A \not\perp\!\!\!\perp B \mid C$

After

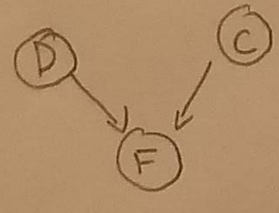


$A \not\perp\!\!\!\perp B$

$A \perp\!\!\!\perp B \mid C$

Similarly, changing direction of (shared) children violates indep

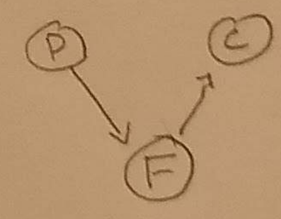
e.g. Before



$D \perp\!\!\!\perp C$

$D \not\perp\!\!\!\perp C \mid F$

After



$D \not\perp\!\!\!\perp C$

$D \perp\!\!\!\perp C \mid F$

$\Rightarrow$ For each node, its Markov boundary cannot change immoralities

$\Rightarrow$ If each Markov boundary can't change immoralities, G_1 & G_2 must have same immoralities