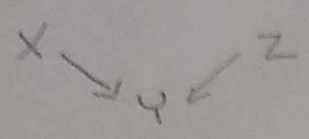
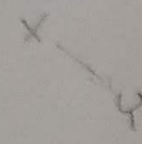
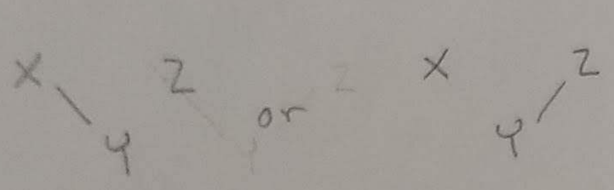
1.5

b)  here, $X \perp\!\!\!\perp Z$ but $X \not\perp\!\!\!\perp Z \mid Y$

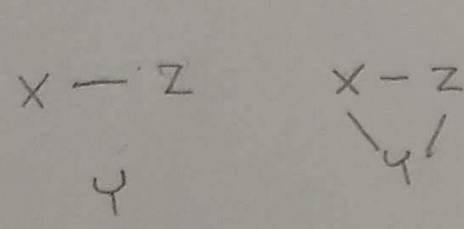
undirected possibilities:



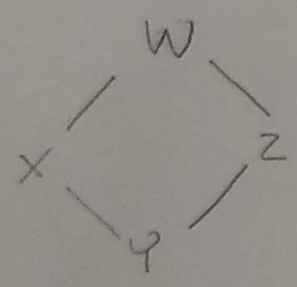
doesn't capture $X \not\perp\!\!\!\perp Z \mid Y$



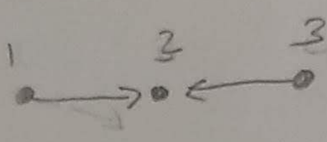
doesn't capture $X \not\perp\!\!\!\perp Z \mid Y$



doesn't capture $X \not\perp\!\!\!\perp Z$

c) 

some node in cycle must have immorality



In undirected graph $1 \perp\!\!\!\perp 3 \mid 2, 4$

In directed graph $1 \not\perp\!\!\!\perp 3 \mid 2, 4$

g) i) No. First, note if 2 undirected graphs have different vertices.

$\Rightarrow$ different distributions

Second, try removing/adding edge $i-j$. In one graph, $x_i \perp\!\!\!\perp x_j \mid$ everything else but in the other $x_i \not\perp\!\!\!\perp x_j \mid$ everything else

The only way to bridge this difference is to ensure both undirected graphs have same edges

Same Nodes + Same Edges $\Rightarrow$ same graph

ii) Yes. $A \to B \to C$, $A \leftarrow B \to C$, $A \leftarrow B \leftarrow C$ all express the same (conditional) independencies