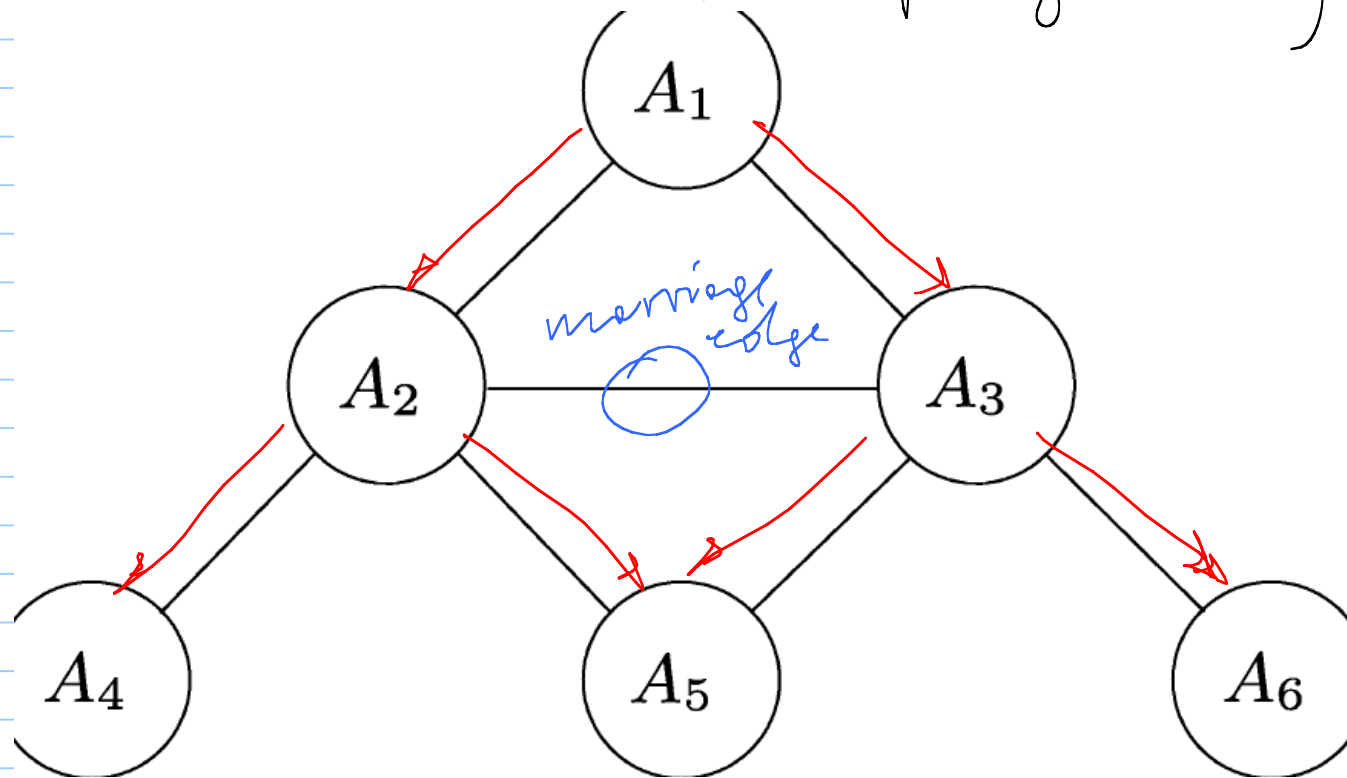


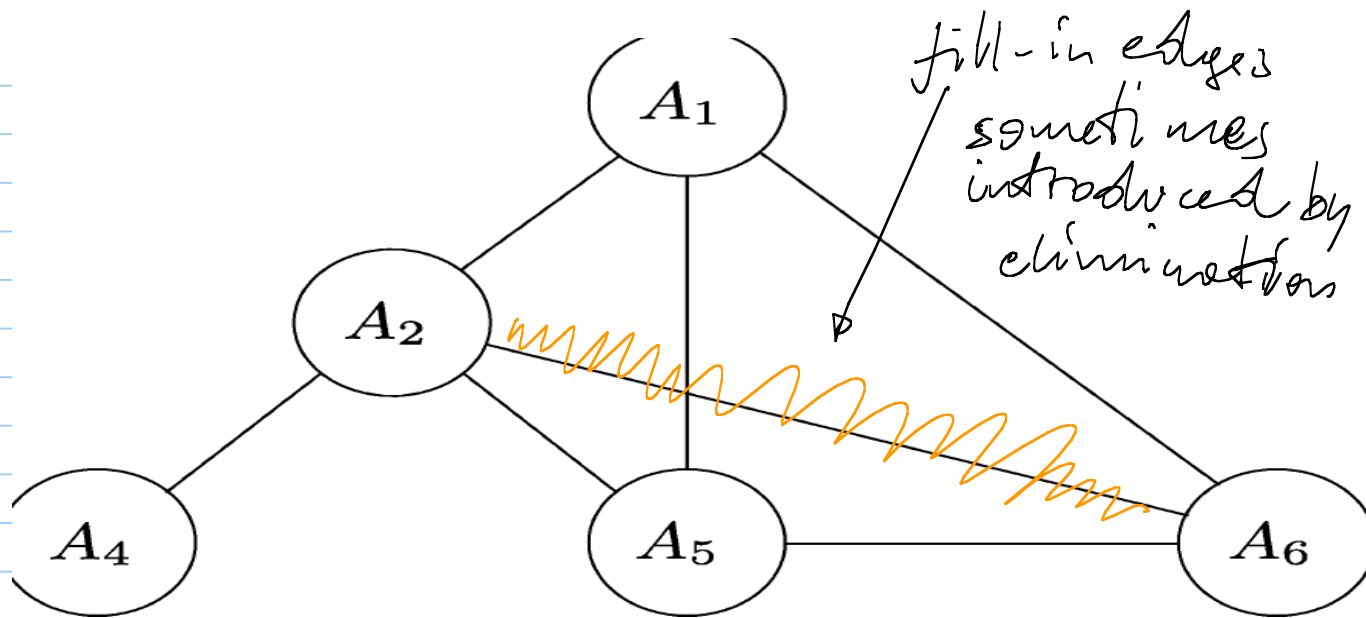
09-03-16 (after spring break)



Moral graph of
a joiner BN
structure (DAG)

Moral graph is
also called a
domark graph
and an
interaction graph

[Sertel and Brioschi, 1972] [BB72].

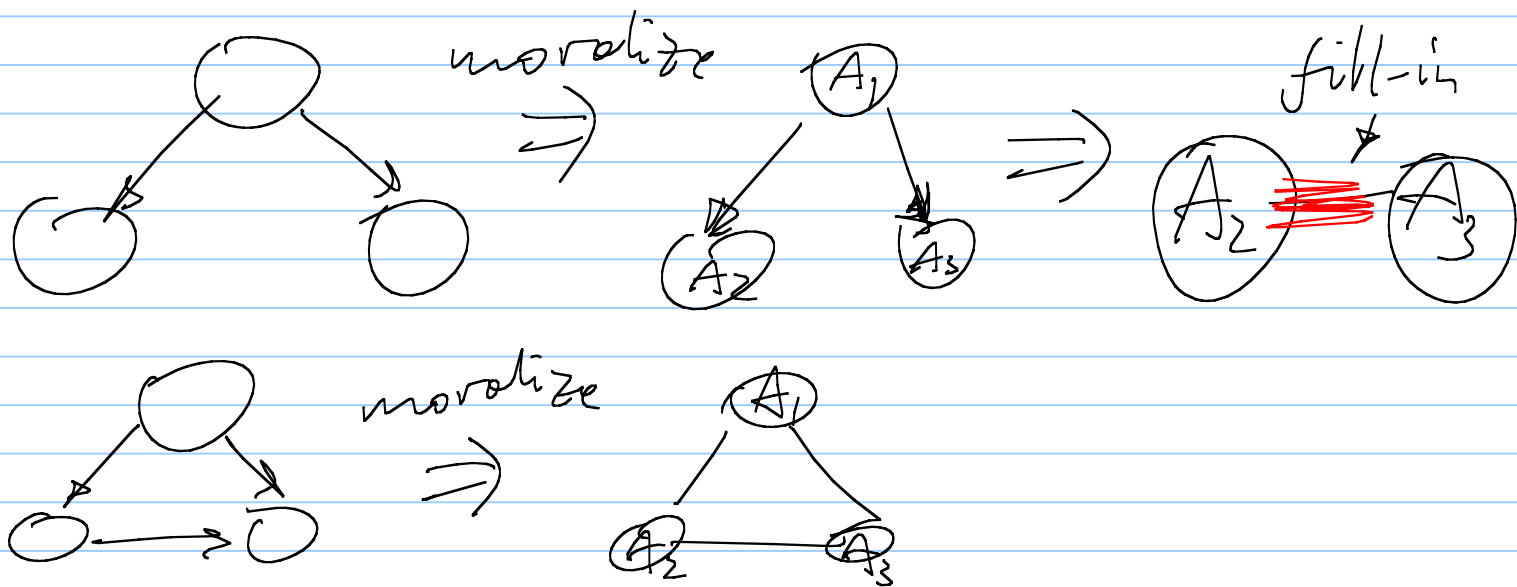


The new domain graph (interaction graph) after eliminating A_3

A new potential (table, function) is created, which includes all variables that interacted with A_3 at the time of elimination / that were neighbors of A_3 at the time of elimination). $\uparrow$ family

$$\begin{aligned} \text{neighbor set } ne(A_3) &= \{A_1, A_2, A_5, A_6\}; & fa(A_3) &= ne(A_3) \cup \{A_3\} = \\ & & &= \{A_1, A_2, A_3, A_5, A_6\} \end{aligned}$$

Def. A perfect elimination sequence is a sequence of the nodes in a domain (interaction) graph such that no fill-in edges are introduced by eliminating nodes in that sequence.



Proposition 4.2. Let $x_1, \dots, x_k$ be a perfect elimination sequence and let x_j be a node with a complete neighbor set. Then, $x_j, x_1, \dots, x_{j-1}, x_{j+1}, \dots, x_k$ is also a perfect elimination sequence.

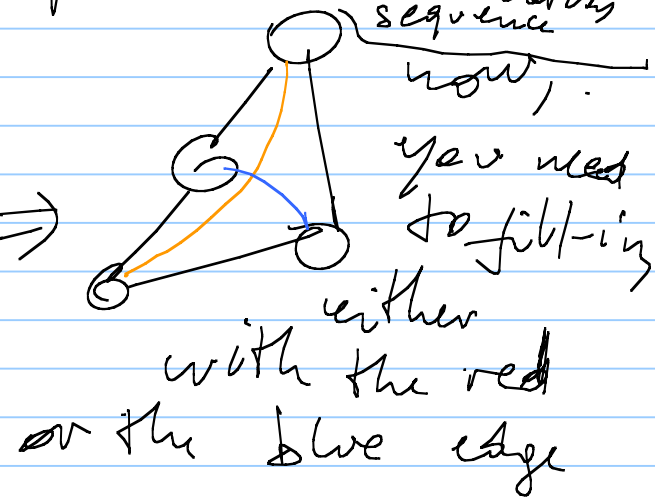
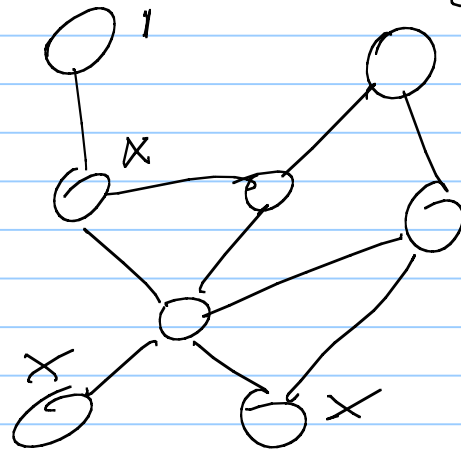
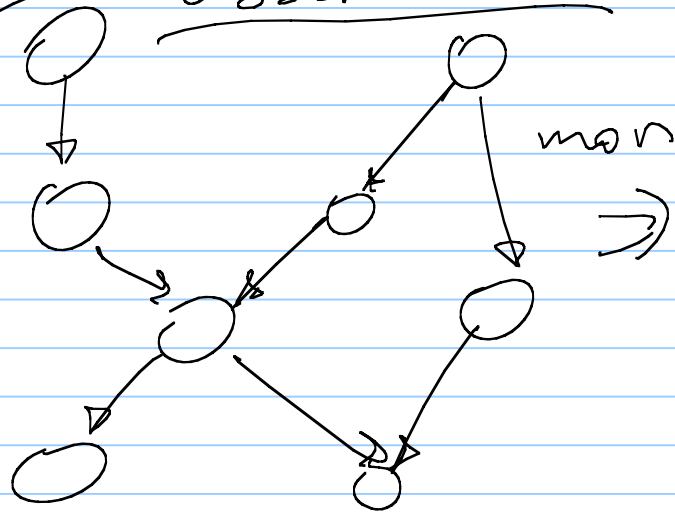
Definition 4.3. The domain set of an elimination sequence is the set of domains of potentials produced during the elimination, in which potentials that are subsets of other potentials are removed.

Proposition 4.3. All perfect elimination sequences produce the same domain set, viz. the set of cliques of the original domain graph. (A clique is

a maximal complete set.)

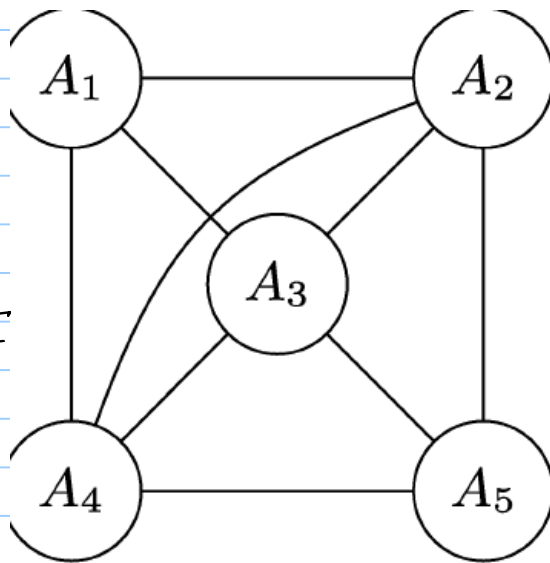
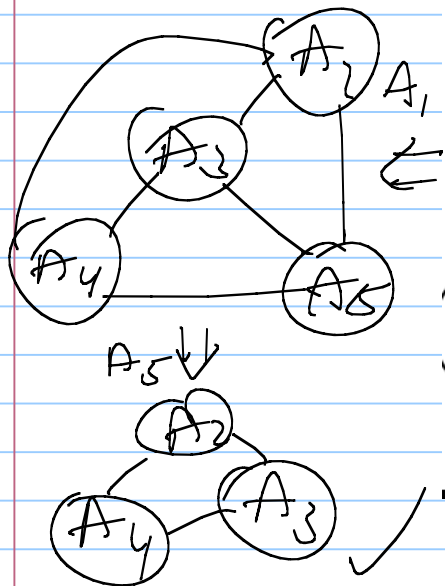
In order to achieve an efficient computation of the marginal of a variable (say, A), we need to obtain a perfect elim sequence ending in A .

Observation: There are some graphs that do not have a perfect eliminating sequence.



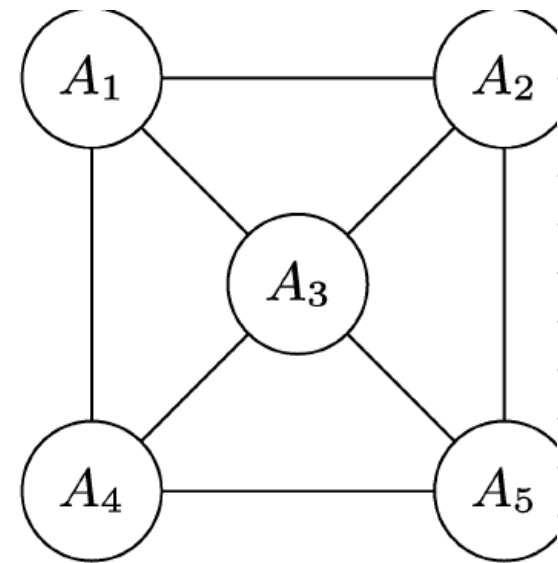
later section!

Defn. 4.4 An undirected graph with a perfect elimination sequence is called a triangulated graph.



(a)

triangulated



(b)

not triangulated

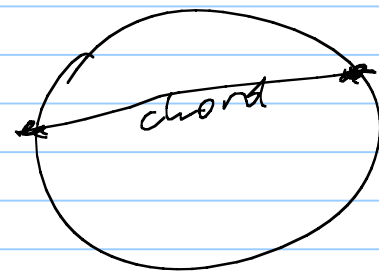
The traditional defn of triangulated graph:

A graph is triangulated if every cycle of length > 3 in it has a chord.

(A chord is an edge between non-successive nodes in a cycle)

Triangulated graphs are also called chordal graphs

Thm A graph is triangulated if and only if it has a perfect elimination sequence.



→ See ex. 4.17 [547]: "chordal + triangulated"