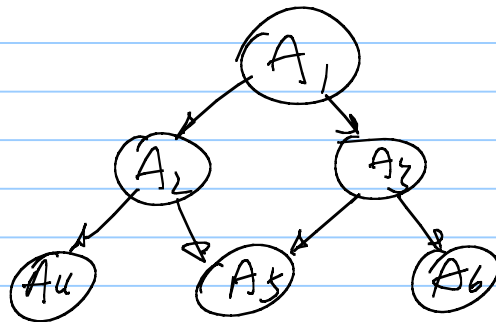


$$P(A_4) = \sum_{A_1, A_2, A_3, A_5, A_6} P(A_1) P(A_2|A_1) P(A_3|A_1) \times \\ \times P(A_4|A_2) \times P(A_5|A_2, A_3) \times P(A_6) =$$



$$= \sum_{A_1} \phi_1(A_1) \sum_{A_2} \phi_2(A_2, A_1) \sum_{A_3} \phi_3(A_3, A_1) \underbrace{\sum_{A_4} \phi_4(A_4, A_2)}_{\phi'_5} \underbrace{\sum_{A_6} \phi_6(A_6, A_3)}_{\phi'_6}$$

$\phi_4(A_4, A_2)$ $\phi'_3(A_1, A_2)$

bucket of A_3
at the time of
its elimination

"factor
tree"

Σ_{A_3}

$$\phi_3(A_3, A_1)$$

$$\phi'_6(A_3)$$

Σ_{A_6}

$$\phi_6(A_6, A_3)$$

bucket of A_6
at the time of
its elimination

Σ_{A_5}

$$\phi'_5(A_2, A_3)$$

$$\phi_5(A_5, A_2, A_3)$$

bucket of A_5
at the time of
its elimination

$$\phi'_3(A_1, A_2)$$

the bucket
of A_2 at the time
 A_2 is eliminated

$$\phi_2(A_2, A_1)$$

$$\phi_4(A_4, A_2)$$

Σ_{A_2}

$$\phi'_2(A_1, A_4)$$

$$\phi_1(A_1)$$

Σ_{A_1}

$$P(A_4) = \Sigma_{A_1} \phi_1 \cdot \phi'_2$$

Fig. 4.2

the bucket
of A_1
at the
time
 A_1
is
eliminated

$$A_6 \quad P(A_6 | A_3)$$

$$A_5 \quad P(A_5 | A_2, A_3)$$

$$A_3 \quad P(A_3 | A_1)$$

$$\phi'_6(A_3)$$

$$\phi'_5(A_2, A_3)$$

$$A_2 \quad P(A_2 | A_1)$$

$$P(A_4 | A_2)$$

$$\phi'_3(A_2, A_1)$$

$$A_1 \quad P(A_1)$$

$$\phi'_2(A_1, A_4) \Rightarrow$$

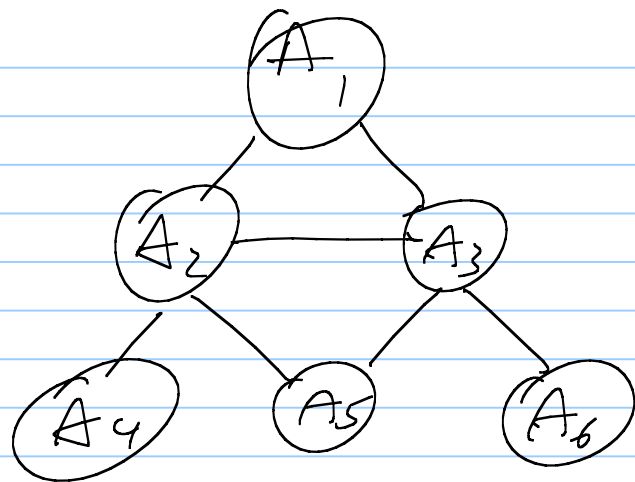
$$\sum_{A_1} P(A_1) \times \phi'_2(A_1, A_4) = P(A_4)$$

$$\phi'_x$$

$$\sum_x$$

product of all

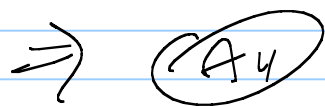
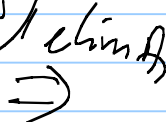
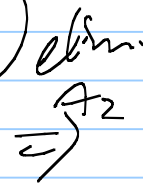
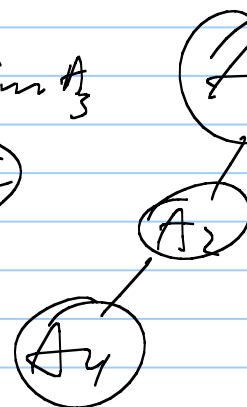
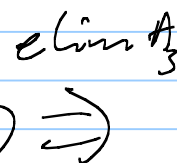
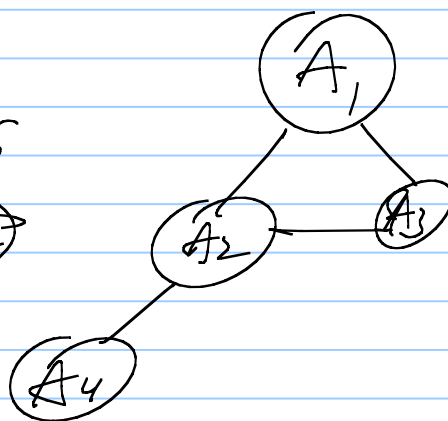
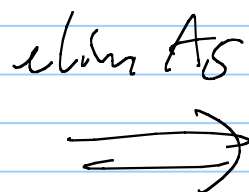
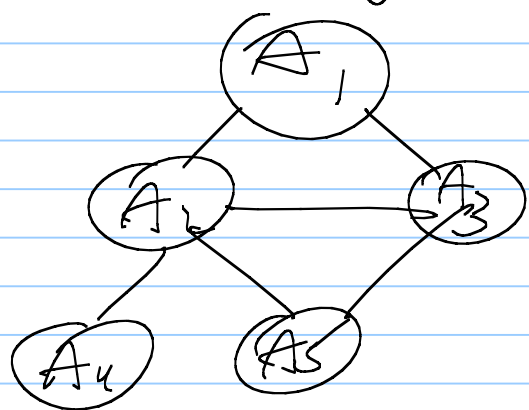
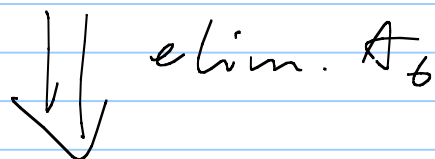
the potentials
in the bucket
of x at the
time we
eliminated
 x .



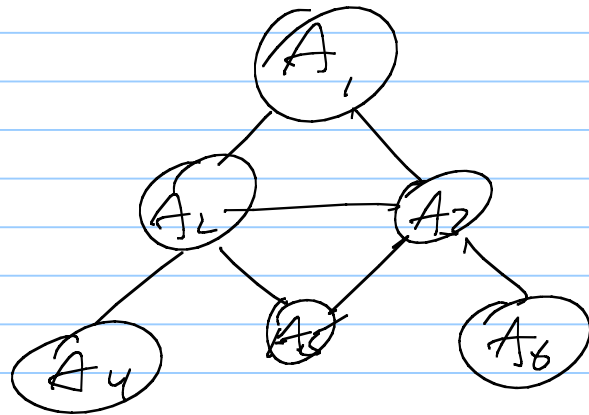
The interaction graph of the original DAG
(or potentials associated w/ it).

$$\phi(A_5, A_2, A_3)$$

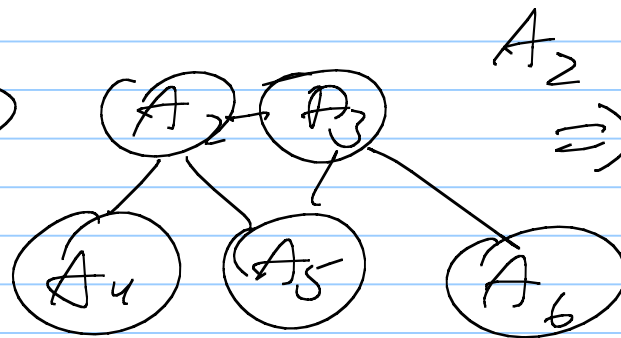
$$P(A_5 | A_2, A_3)$$



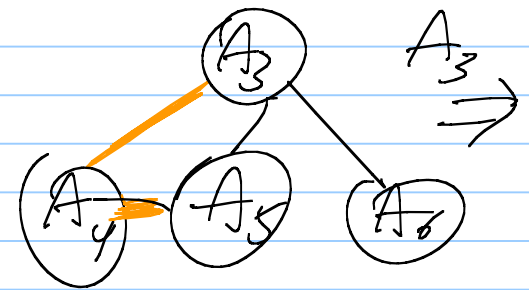
$\langle A_1, A_2, A_3, A_5, A_6 \rangle$



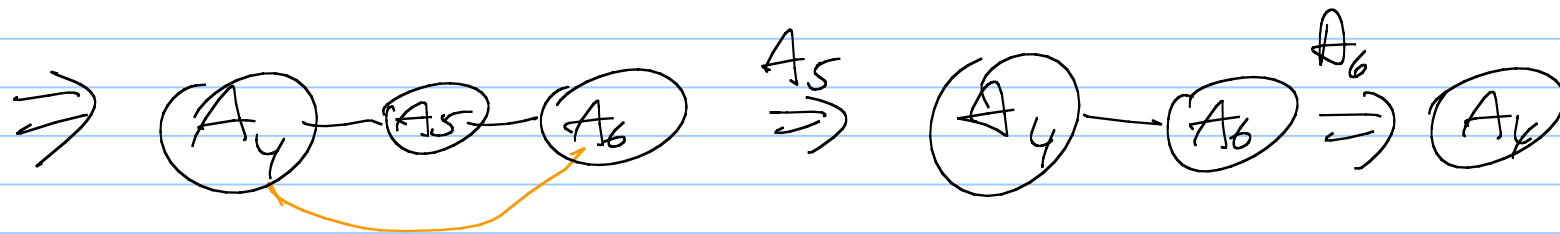
$\xRightarrow{A_1}$



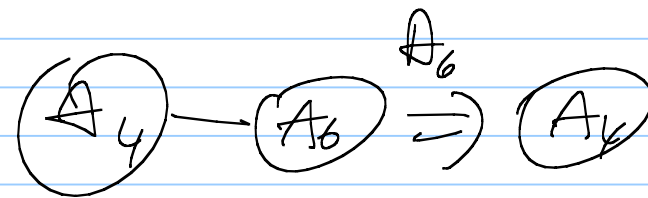
$\xRightarrow{A_2}$



$\xRightarrow{A_3}$



$\xRightarrow{A_5}$



$\xRightarrow{A_6}$



