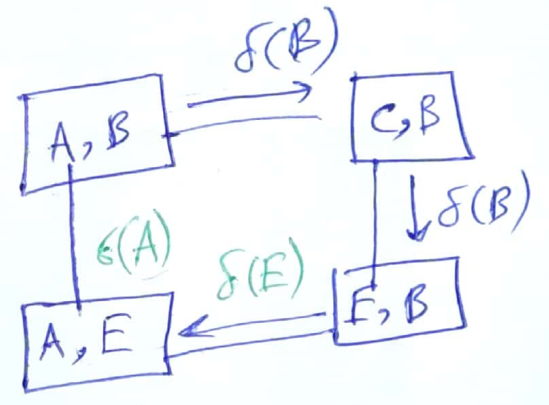
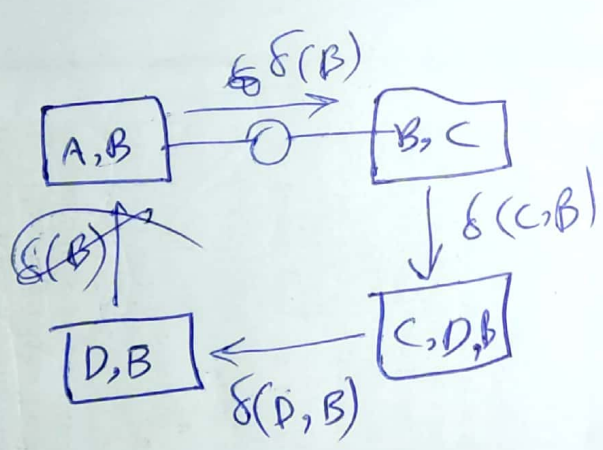
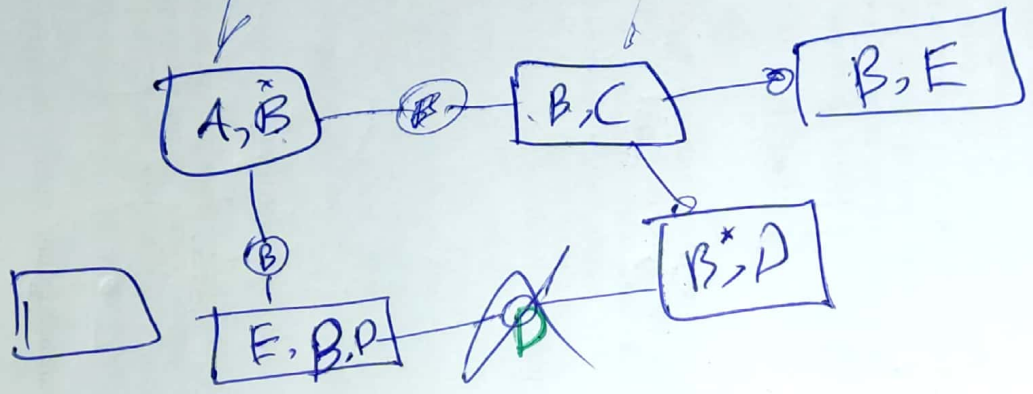


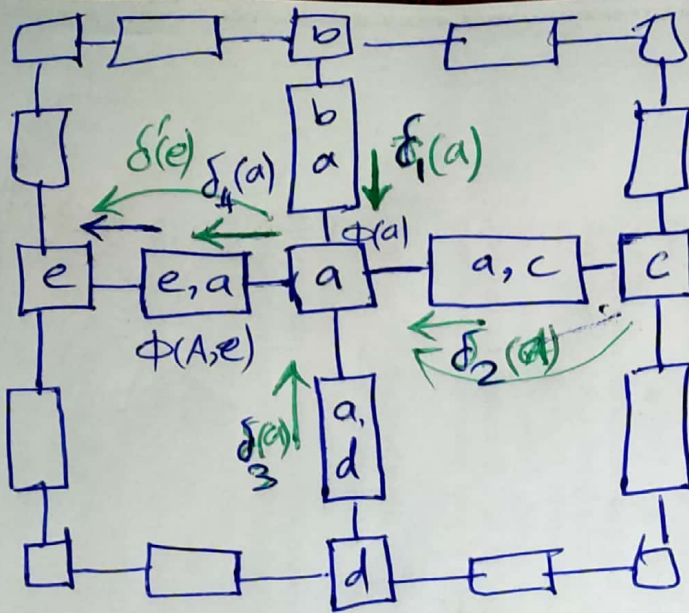
میانم

belief propagation (sum-product)

$$\sum \sum \sum \phi(A, B) \phi(A) \phi(B, C) \phi(D, E)$$

$$\sum_A \phi(A, B) \phi(A)$$



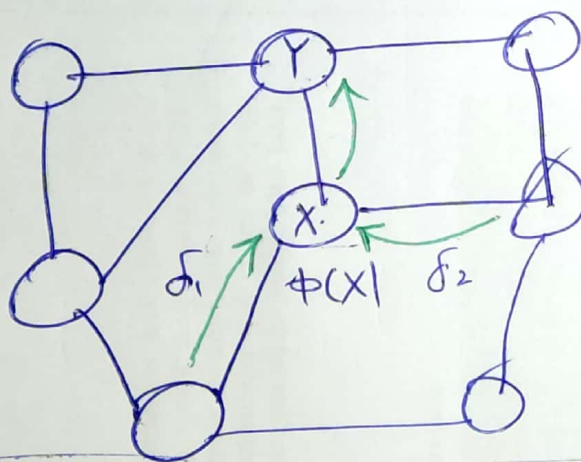


$\phi(a)$
 $\phi(a,e)$

$$\delta_4(a) = \delta_1(a) \delta_2(a) \delta_3(a) \phi(a)$$

$$\delta_5(e) = \sum_a \delta_4(a) \phi(a,e)$$

$$\delta'(e) = \sum_{a \rightarrow e} \delta_1(a) \delta_2(a) \delta_3(a) \phi(a) \phi(a,e)$$



$$\delta'(X,Y) = \phi$$

$$\delta'(Y) = \sum_{X \rightarrow Y} \phi_1(X) \phi_2(X,Y) \delta_1(X) \delta_2(X)$$

$$\delta'(Y) = \sum_X \delta_1(X) \delta_2(X) \phi_1(X) \phi_2(X,Y)$$

$$= \mathcal{D} \left(\begin{matrix} \mathcal{P} \\ \mathcal{A} \end{matrix} (d_1(x), d_2(x), \dots, d_n(x); \phi_1(x); \phi(x,y)) \right)$$