MB Exercise 12

Z Seriously Cool Guys

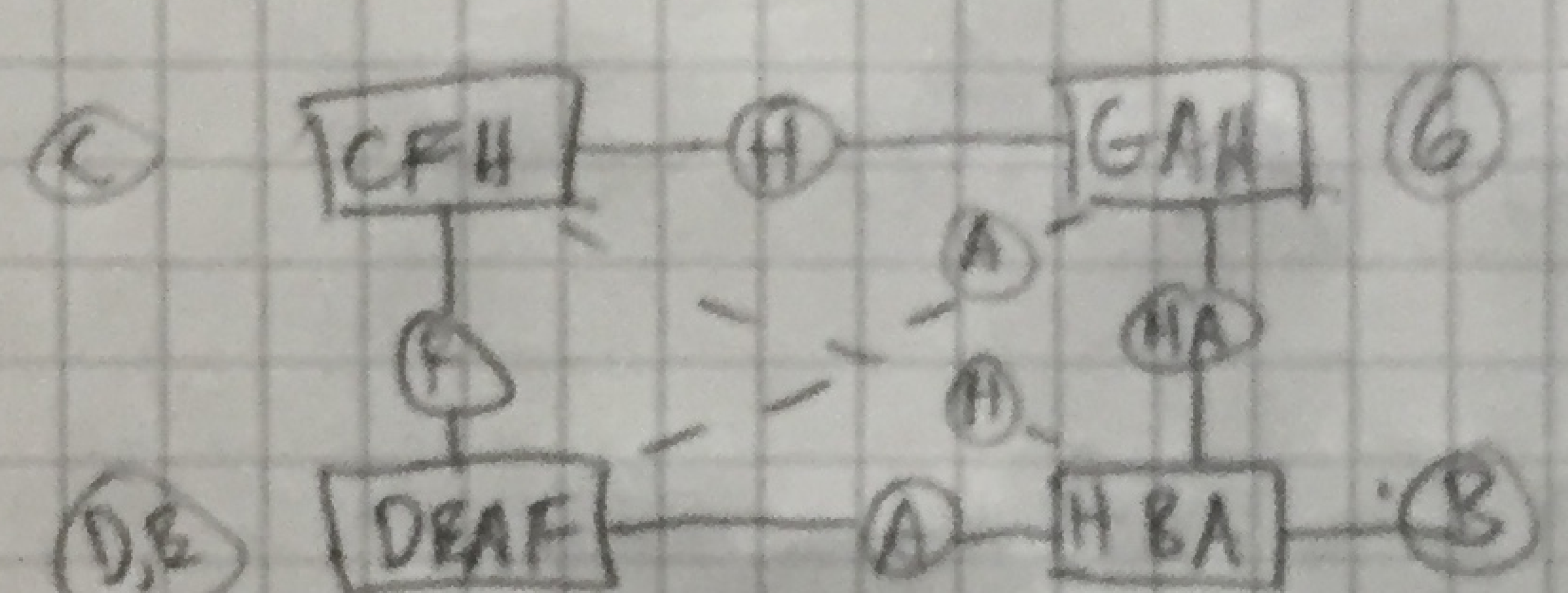
Due Feb 7, 2019

12.1

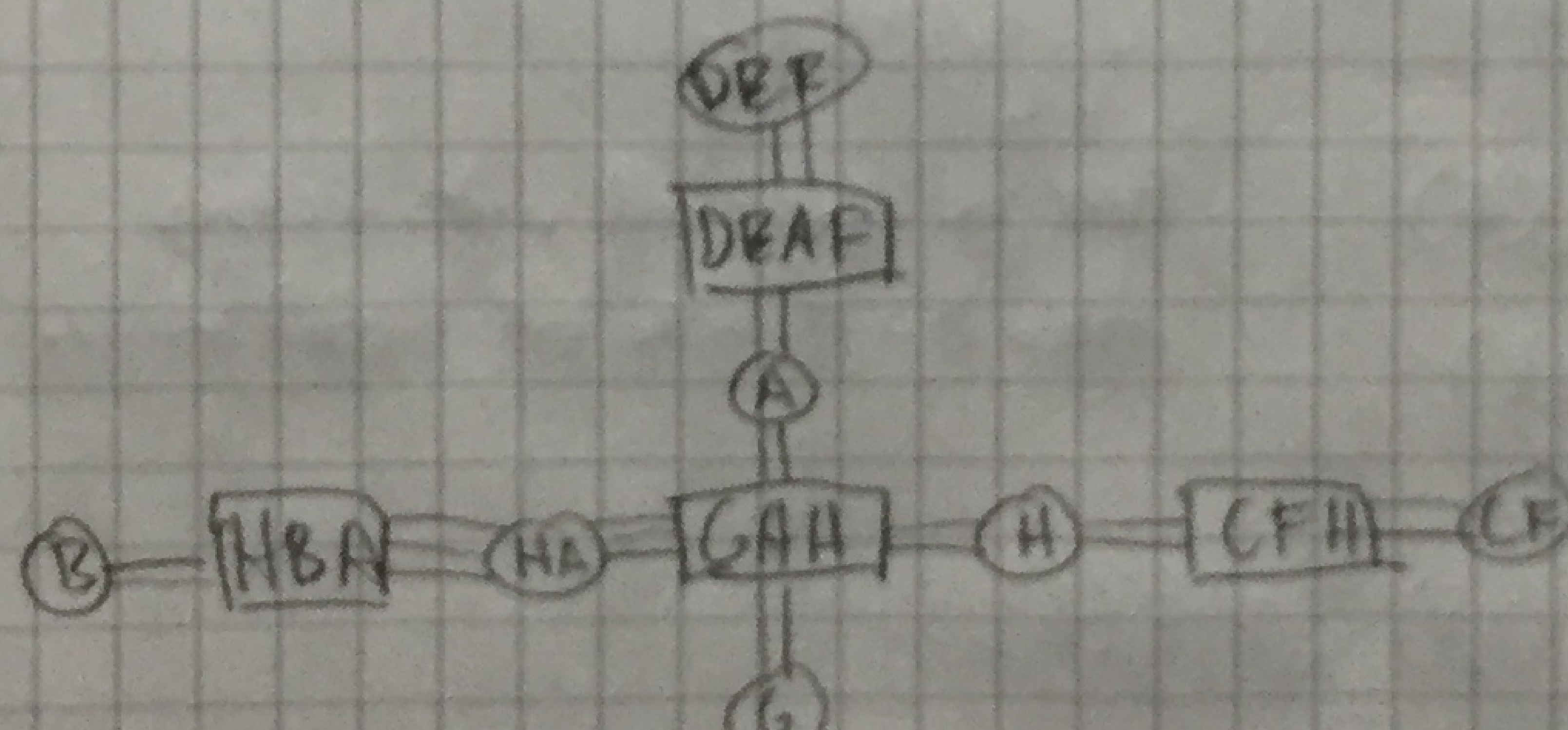
(a)

Topological Sorting (reverse, from child to parent)	Maximal Clique
C	CFH
G	GAH
D	DBAF
E	none (already accounted for by DBAF)
H	HBA
B	none
A	none

(b)



(c)



(d)

It's evident → all nodes on every path between Z cliques (which contain variable Z) have variable Z. In 12.1C, double & triple lines indicate the connection a given variable Z provides between cliques.

(2a.)

Distribute

1) $G \to F_6 \to F \to F_5 \to E \to F_4 \to D \to F_2 \to B$
2) $H \to F_3 \to E \to F_4 \to D \to F_2 \to B$
3) $A \to F_1 \to D \to F_2 \to B$
4) $C \to F_2 \to D \to F_2 \to B$

Request & Collect occurs in the reverse order of the above distribute sequence.

(2b.) LR branch: $\mu_{f_6 \to F}(F) = \sum_G f_6(G,F)$

$\mu_{F \to f_5}(F) = \mu_{f_6 \to F}(F)$

$\mu_{f_5 \to E}(E) = \sum_F f_5(F,E)$

LR branch: $\mu_{F_7 \to E}(E) = \sum_H f_7(H,E)$

$\mu_{E \to f_4}(E) = \mu_{f_5 \to E}(E)\, \mu_{f_7 \to E}(E)$

$\mu_{f_4 \to D}(D) = \sum_E f_4(D,E)\, \mu_{E \to f_4}(E)$

(2c.)

$\mu_{f_5 \to E}(E) = f_5(E)$

$\mu_{f_2 \to E}(E) = f_7(E)$

Here, we neglect all nodes & cliques after H & F, on the collect path from D.

$\mu_{f_4 \to D}(D) = \sum_E f_4(D,E)\, f_5(E) f_7(E)$

(2d.) $P(D \mid F=f, H=h) = \alpha\, \tilde{P}(D)$; $\alpha = \frac{1}{\sum_D \tilde{P}(D)}$

$P(A \mid F=f, A=h) = \alpha\, \tilde{P}(A \mid D)\, \tilde{P}(\tilde{D})$; $\alpha = \frac{1}{\sum_A \tilde{P}(A)}$