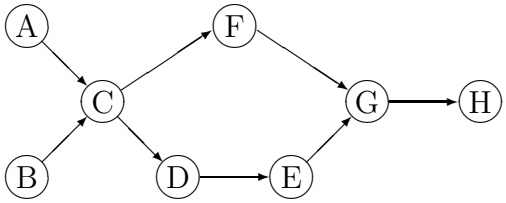
Exercise Sheet 3

Exercise 9 Separation Criteria: d-Separation

Consider the following directed graph:



Which of the following propositions hold true in the graph??
(„$X \perp\!\!\!\perp Y \mid Z$“ denotes „$X$ and Y are d-separated (in G) by Z.“)

i) $F \perp\!\!\!\perp H \mid G$
ii) $C \perp\!\!\!\perp G \mid F$
iii) $F \perp\!\!\!\perp E \mid C$
iv) $A \perp\!\!\!\perp B \mid \emptyset$
v) $A \perp\!\!\!\perp B \mid D$
vi) $D \perp\!\!\!\perp F \mid \{C, G\}$
vii) $E \perp\!\!\!\perp F \mid \{A, B\}$
viii) $C \perp\!\!\!\perp E \mid \{D, F, H\}$

Exercise 10 Separation Criteria: u-Separation

Consider the undirected graph that is obtained if all arrow heads from the directed graph in exercise 9 are dropped. Check again the propositions i)–viii) of exercise 9, now with the u-separation criterion! Which differences can be observed?

Exercise 11 Separation Criteria: d/u-Separation

Remember the alternative way of checking for d-separation that was presented in the lecture (slides 56–58): X and Y are d-separated by Z if X and Y are u-separated by Z in the moralised minimal ancestral subgraph induced by $X \cup Y \cup Z$. With this approach, verify again the results from exercise 9!