0.1 Question 1

0.1.1 Part A

Joint distribution is: $P(D)P(S)P(C|D)P(I|C)P(V|C,S,J)P(J|D)P(T|J)$

0.1.2 Part B

0.1.3 Part C

Found this question a bit confusing so I'll explain best I can...

P(S—J) = J $\rightarrow$ V $\leftarrow$ (no blocking) P(S—D) = D $\rightarrow$ C $\rightarrow$ V $\leftarrow$ S (no blocking) P(S—I) = I $\leftarrow$ C $\rightarrow$ V $\leftarrow$ S (no blocking) P(S—C) = C $\rightarrow$ V $\leftarrow$ S (no blocking)

For paths C $\rightarrow$ V $\leftarrow$ S and J $\rightarrow$ V $\leftarrow$ S both paths are always unblocked as V is conditioned on.

By conditioning on the variables J, D, I, C, no blocking occurs and hence S is not conditionally independent on J, D, I or C and there is therefore no observation that would lead to no extra information(all would lead to an increase in information).

If you could condition on both C and J, S would become conditionally independent of D but as we are limited to one additional variable, if you condition simply on C or J, there is still a path from D to S via the symmetric route and as such D is not independent.