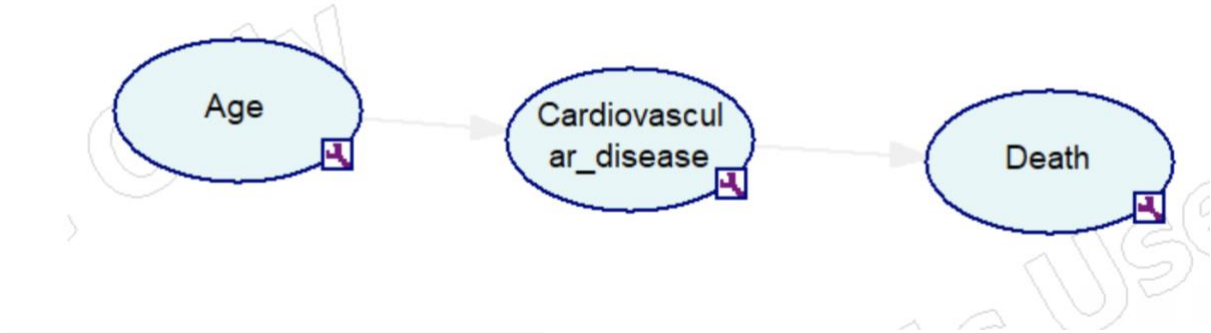
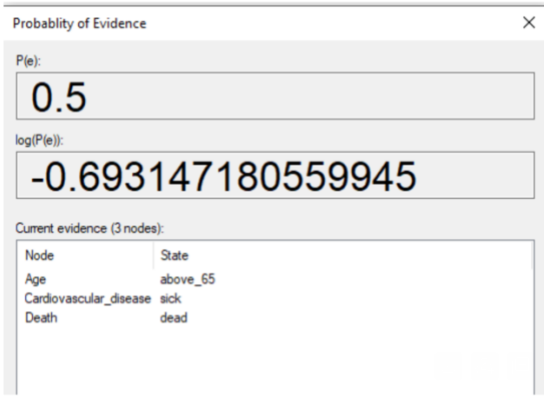
Lab 14

1.

1. Serial Connection (Chain):

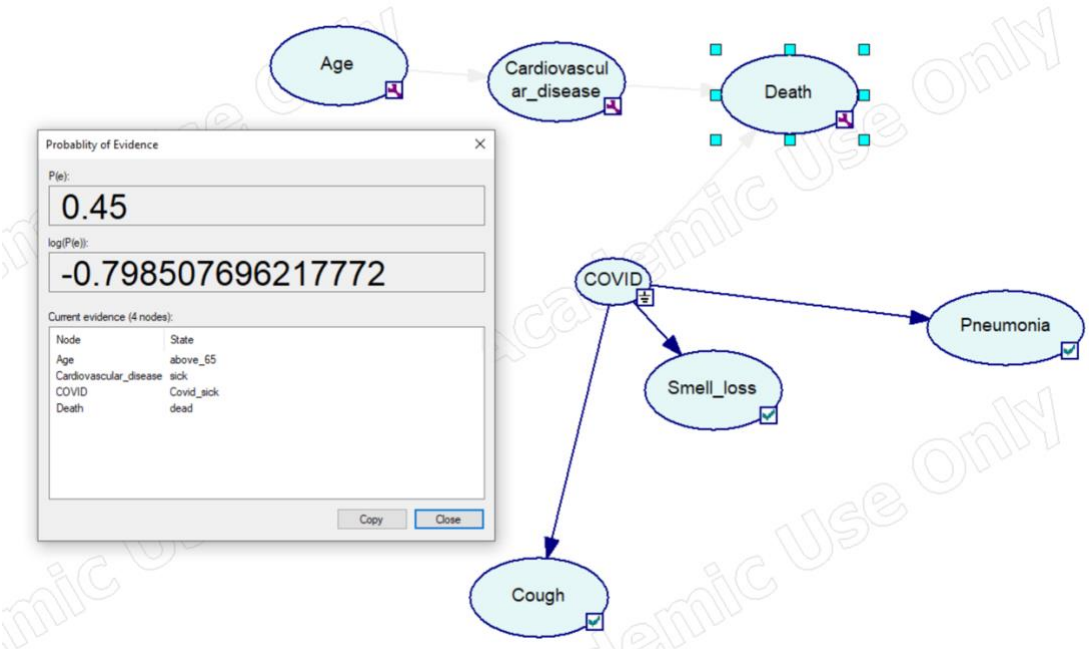
   Age → Cardiovascular Disease → Death

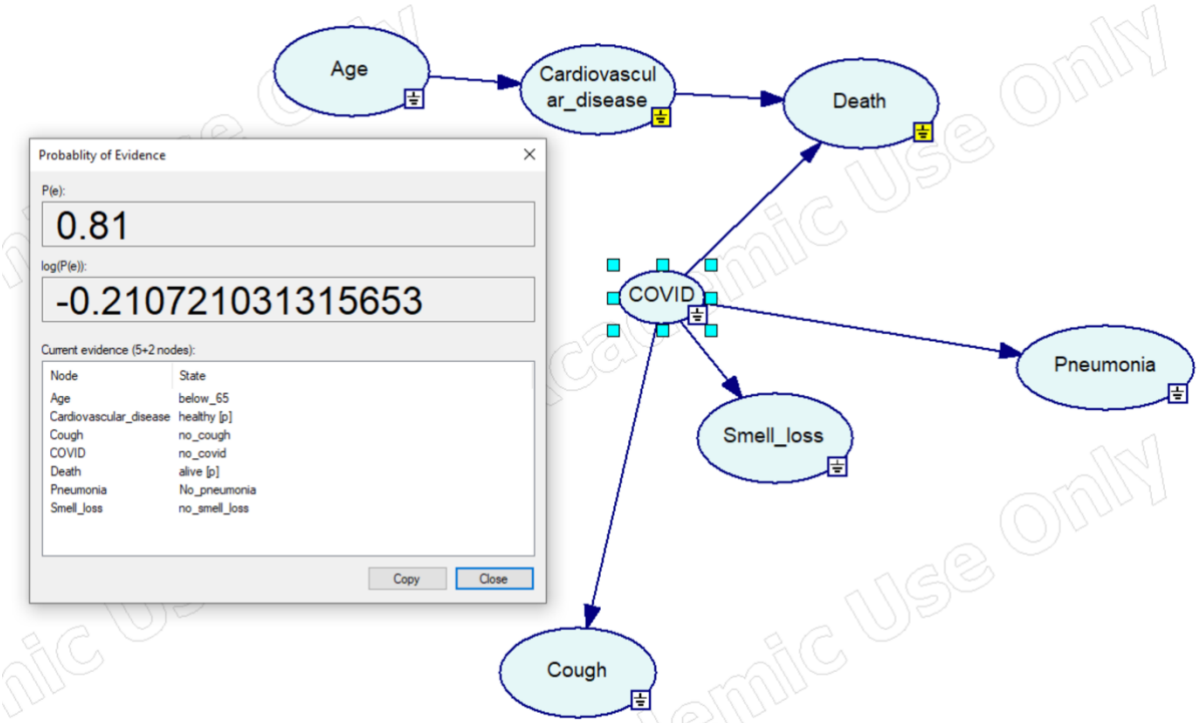




2. Diverging Connection (+previous connections):

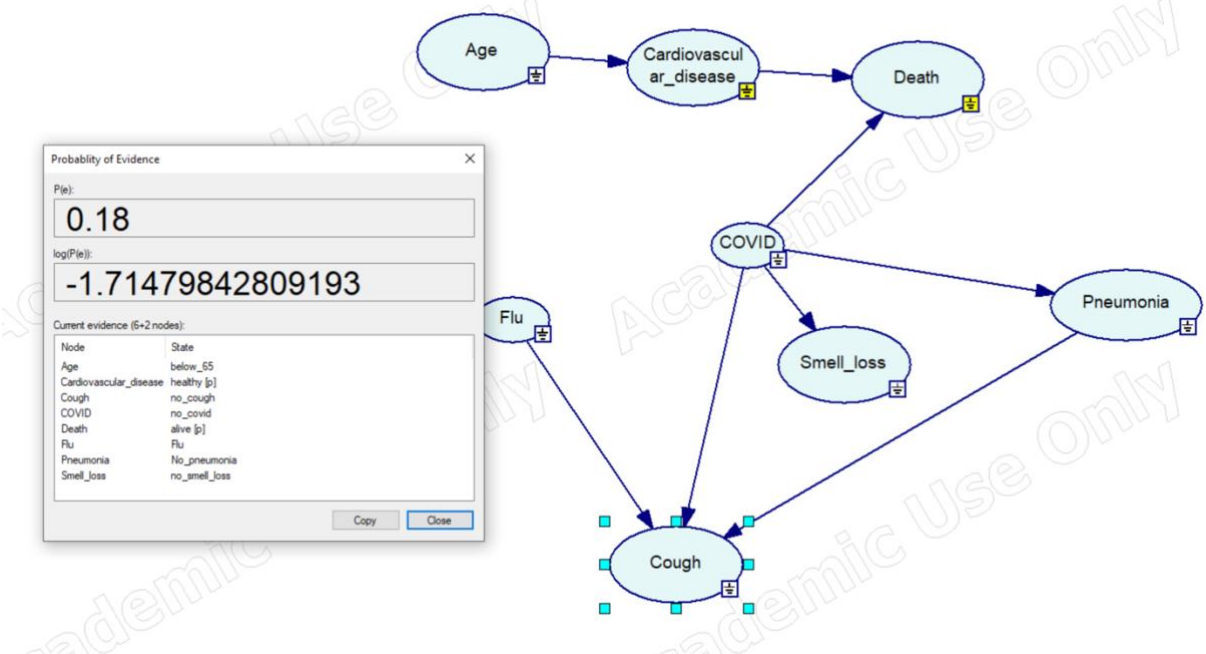
COVID → (Smell Loss, Cough, Pneumonia, Death)





3. Converging Connection (V-Structure) (+previous connections):

(Flu, Pneumonia, COVID) → Cough



The low probability of the evidence in the Bayesian network can be attributed to the combination of states set for the nodes, which appears to be unlikely within the given model. The evidence states, such as "below_65" for Age, "healthy" for Cardiovascular Disease, "no_cough," "no_covid," "alive," "no_flu," "no_pneumonia," and "no_smell_loss," collectively form a scenario that the network's parameters and conditional probability tables (CPTs) deem rare. This rarity is due to the interdependencies among various health

conditions and symptoms in the network. The probability values in the CPTs suggest that the simultaneous absence of these conditions and symptoms is uncommon. As a result, the overall probability of this combination of evidence is low, reflecting the model's assumptions and its representation of the domain's realistic scenarios.

2. In the Bayesian network, selecting the nodes "Age" and "X-ray Result," which are far from each other, they are not d-separated without any observed evidence due to the multiple pathways connecting them. Observing the nodes "Pneumonia," "Cardiovascular Disease," "Death," and "COVID" would block all paths, achieving d-separation. This aligns with the domain understanding, as these intermediary health conditions mediate the relationship between age and the likelihood of a particular X-ray result, reflecting realistic medical scenarios.