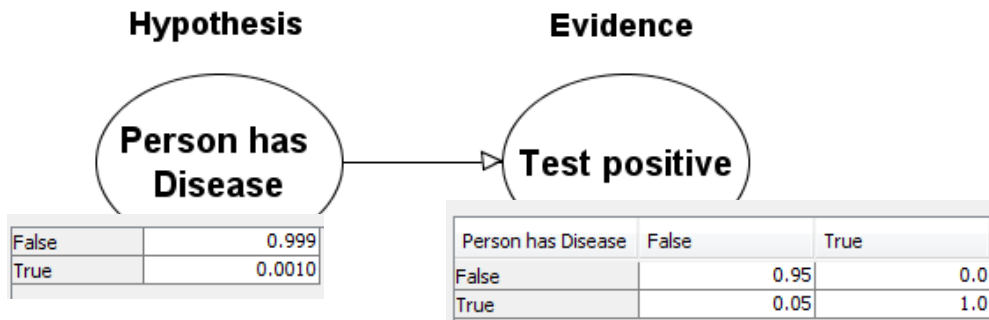


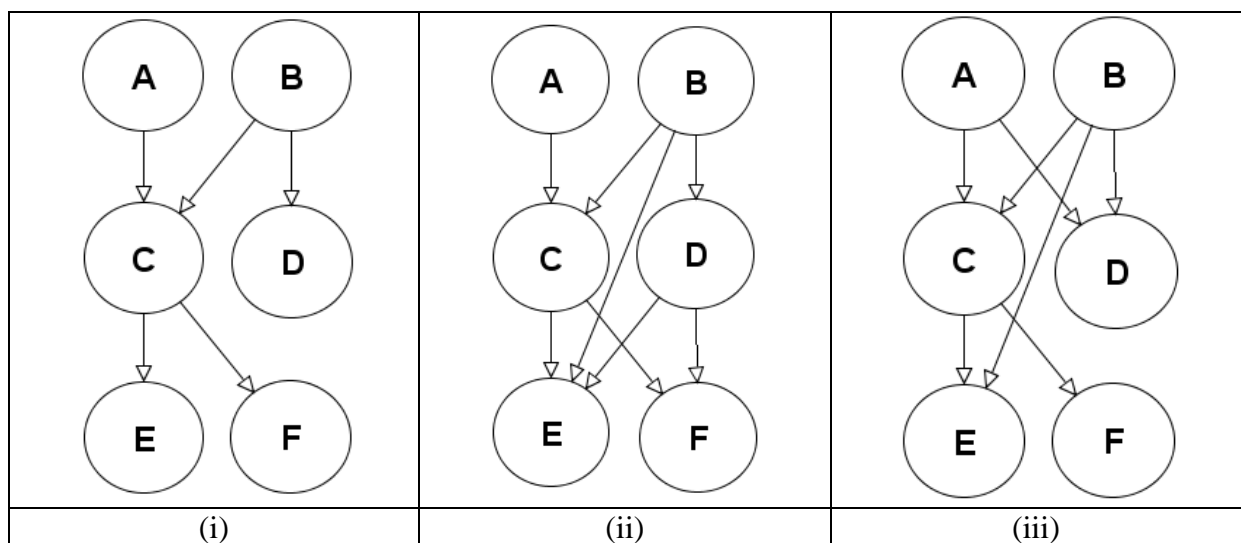
Chapter 6 Exercises

Exercise 1: Consider again the example of a test to determine if a person has a particular disease. First construct the BN model using the NPTs shown here:



Now suppose we run the test again. By constructing a suitable new BN model calculate the probability the person has the disease if *both* test results are positive. Provide results with different assumptions about independence of the tests. Extend to three tests.

Exercise 2: For each of the following BN models involving 6 variables A,B,C,D,E,F, write the expression for the full simplified joint probability distribution $P(A, B, C, D, E, F)$



Exercise 3: In AgenaRisk open the example BN model “Printer Fault Diagnosis” in the Examples/Basic folder. Identify examples of pairs of nodes that are a) d-connected; and b) separated. Check your solution by entering relevant observations and running the model.

Exercise 4: Draw the junction tree for each of the models in Exercise 2 above.

Exercise 5: Use AgenaRisk to create the flood model described in Section 6.9.1, creating sensible NPTs for those that are not specified in the book.

Exercise 6: In AgenaRisk open the example BN model “Asia” in the Examples/Introductory folder. Note that, with no evidence entered, the probabilities for “Smoker”, “Visit to Asia” and “Lung Cancer” are respectively 50%, 1% and 5.5%

- i. Use the risk table view to enter soft evidence for the node “Smoker”. Specifically, enter the values 90 and 10 respectively to capture the idea that you are 90% certain the person is a smoker. Now run the model. What are the updated probabilities for: “Smoker”, “Visit to Asia” and “Lung Cancer” respectively?
- ii. Remove the evidence you entered in (i) for ‘Smoker’ and enter soft evidence for the node “Visit to Asia”. Specifically, enter the values 90 and 10 respectively to capture the idea that you are 90% certain the person has visited Asia. Run the model. What are the updated probabilities for: “Smoker”, “Visit to Asia” and “Lung Cancer” respectively?
- iii. Explain the apparent discrepancy between the way soft evidence for “Smoker” and “Visit to Asia” was handled.