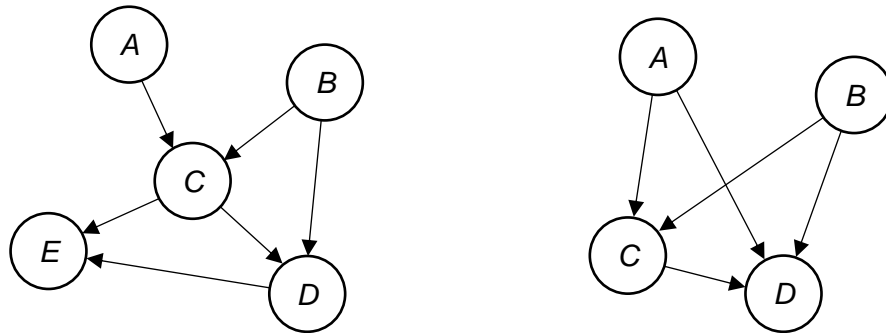


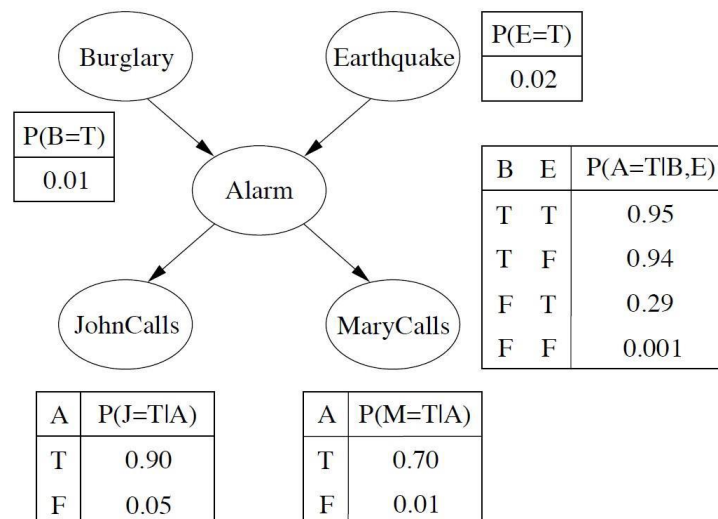
Worksheet 12: Probabilistic Graphical Models

1. For the following PGMs:

- Write down the factorised joint distribution.
- Count the number of free parameters in the conditional probability tables (assuming each variable is Boolean).



2. Leo is a data scientist who lives in the Bay Area. His neighbourhood is a hotspot for burglars, so his house is fitted with an alarm system. Unfortunately, the alarm is not perfectly reliable: it doesn't always trigger during a home invasion, and it may be erroneously triggered during earthquakes, which occur from time-to-time. Leo has asked his neighbours John and Mary (who don't know each other) to call him if they hear the alarm. Leo would like to determine the likelihood that his home is being burgled if he receives a phone call from both John and Mary. Use the following PGM to help him answer this question.



3. The following questions relate to the PGM from question 2:

- Are the 'Burglary' and 'Earthquake' nodes independent?
- What if we observe 'MaryCalls' = T? Does your answer change?
- What if we observe 'Alarm' = T? Does your answer change?