Bayesian Networks - Exercise 6

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Solutions need to be handed in until **Tuesday, December 6th 10:00 am (morning) via Learnweb as a PDF only**
`https://www.uni-hildesheim.de/learnweb2016/?lang=en`
key is the course number (3106)

Exercise 1: Forward and backward Inference/ Variable elimination (20 Points)

Let us assume the following:

- Someone with a Cold (C) drinks tea (T) with the probability 0.8.
- Someone without a Cold (C) drinks tea with the probability 0.3.
- Half of the people with a Cold (C) have fever (F).
- Of those without a Cold (C) 1/10 have fever (F).
- Someone with a Cold (C) drinks Juice (J) with the probability of 75%.
- Someone without a Cold (C) drinks Juice (J) with the probability 0.25
- Someone with Fever (F) goes to the doctor (D) with the probability of 80%
- Of those without Fever (F) just 20% go to the doctos (D).
- Someone who drinks tea (T) and Juice (J) spends with the probability 0.5 a lot of money (M) in the Bio store.
- Someone who only drinks tea (T) spends a lot of money (M) with the probability 0.3 in the Bio store.
- 40% of those who never drink Juice (J) spend a lot of Money (M) in the Bio Store.
- Someone who neither drinks tea (T) nor Juice (J) spends a lot of money (M) in the Bio store with the probability of 20%.
- Of all people 30% have a Cold (C).

Answer the following questions:

a) Model all dependencies in a directed, acyclic graph G and write down the conditional probabilities.

b) John has a Cold. What is the probability thet he is going to the doctor? (forward inference)

c) Sally spent a lot of money in the Bio store. What is the probability that he drank 1. tea (2. drank juice)?

d) Marc drinks juice. What is the probability that he has fever? Calculate via variable elimination on a subgraph of G. :

e) Tim spent a lot of money in the Bio store. What is the probability that Tim goes to the doctor? Calculate via variable elimination on G