Homework 4 Primer

1. I Want to Believe

The Bayesian network shown below describes a typical evening at home for your friend Fox Mulder. On any given night, he may decide to make toast, he may get abducted by aliens, he may experience memory loss, and/or there may be a burning smell in his apartment.

   a. On a typical night, do you expect fox to be abducted by aliens?

   On a typical night, I do not expect Fox to get abducted by aliens.

   b. On a typical night, do you expect Fox to suffer memory loss?

   On a typical night, I would not expect Fox to suffer memory loss. The only way that memory loss becomes likely on a given night is if Fox is abducted, an event with very low overall likelihood.

   c. Is Fox more likely to experience memory loss on a night where he gets abducted by aliens or a night where he is not abducted by aliens?

   Fox is more likely to experience memory loss on a night where he is abducted by aliens.

   d. Is fox more likely to be abducted by aliens on a night where he experiences memory loss or a night where he does not experience memory loss?

   Experiencing memory loss has no affect on the likelihood of Fox having been abducted by aliens that night.

   e. Which is greater: (a) the probability of Fox getting abducted by aliens, or (b) the probability of Fox getting abducted by aliens *and* making toast?

   The probability of Fox only getting abducted is higher than the probability of Fox getting abducted and making toast.

   f. Which is greater: (a) the probability of Fox getting abducted by aliens, or (b) the probability of Fox getting abducted by aliens *or* making toast?

   The probability of Fox getting abducted or making toast is higher than the probability of Fox only getting abducted

   g. You discover a bewildered Fox in his apartment, unable to recall the night's events (IE, memory loss, and you wonder whether he was abducted by aliens. Suddenly, you notice a burning smell. Does this new evidence change your degree of belief that fox was abducted? Why or why not?

   No, this new evidence does not change the degree of belief that Fox was abducted. Neither memory loss nor the burning smell have an impact on the likelihood that fox was abducted by aliens.

h. A short time later, you notice that the toaster is warm, and that Fox's face is covered with breadcrumbs. Does this new evidence change your degree of belief that Fox was abducted (relative to the previous question)? Why or why not?

Again, the new evidence does not change the degree of believe because none of these variables have any affect on the likelihood of getting abducted by aliens in the first place.

2. Do you feel lucky today?

Some people believe that finding four-leaf clovers is associated with good luck, or happiness, or both. However, there are several causal mechanisms that could explain these associations. For each scenario below, draw a DAG for the causal Bayesian network that agrees with the description, using the variables C (finding a four-leaf Clover), L (having good Luck), and H (Happiness). For some, there are multiple correct answers.