Guidelines: You can brainstorm with others, but please solve the problems and write up the answers by yourself. You may use textbooks (Koller & Friedman, Russell & Norvig, etc.), your notes, and lecture slides from Winter quarter. Please do NOT use any other resources (e.g., online problem solutions) without asking. Please show enough of your work to make your approach clear.

1. [25 pts] Consider the following statements:
   - People send email more often when indoors.
   - Spending time indoors is a consequence of the weather outside and whether or not you’re a vampire. (Vampires spend more time indoors, especially when it’s sunny.)
   - Both the current season and time of day affect the weather.
   - Being bitten by a vampire causes you to be a vampire.
   - Vampires are preternaturally beautiful (as an effect of being a vampire)

   (a) Use these statements to come up with a Bayesian network over variables Email, Indoors, Weather, Time, Season, Vampire, Bitten, and Beauty.
   (b) In this network, what is the Markov blanket of Vampire?
   (c) According to this network, are beautiful people more likely to send email?
   (d) According to this network, are time of day and beauty independent?
   (e) According to this network, are time of day and beauty independent, given email?
   (f) How many different Bayesian network structures are there that specify this same set of independencies?

2. [25 pts] K&F 3.4 (Other types of intercausal reasoning.)

3. [25 pts] K&F 3.7 (Computing the distribution over a single variable. HINT: Use the Markov blanket.)

4. [25 pts] K&F 3.10 (Prove that a node is d-separated from its non-descendants given its parents.)

5. [10 pts] (Extra Credit) K&F 3.9.