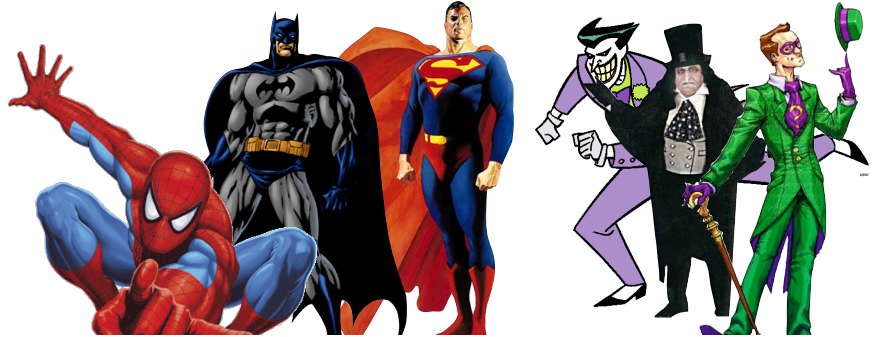Suzie is about to go on her very first blind date. Her mom is a little worried, and wants to give her a way to tell good from bad guys. She trains a Naïve Bayes classifier to predict if people are good or evil. As training data she collects six people who she knows are definitely good (Batman, Superman, Spiderman) or bad (Riddler, Penguin, Joker).

She defines the following binary features:
C = "Guy wears a cape."
M = "Guy wears a mask."
U = "Guy wears his underwear outside his pants."

	Spiderman	Superman	Batman	Joker	Penguin	Riddler
C	F	T	T	F	T	F
M	T	T	F	F	F	T
U	F	T	T	F	F	F
Y	T	T	T	F	F	F

The label is:
Y = "Guy is good"
[Hint: It might help if you draw a Bayes Net with all four variables.]

7) [1] Before Suzie goes on her date, based on her training data, what is the prior probability that her date will turn out good **P(Y)**?

8) [1] If she trains a Naïve Bayes classifier (without smoothing). What is the CPT entry for **P(¬C | Y)**?

9) [1] If she trains a Naïve Bayes classifier (without smoothing). What is the CPT entry for **P(¬M | Y)**?

10) [2] What is the value **P(¬C|Y)** if she uses Laplace (+1) smoothing?

Suzie spots her date, but to her disappointment he already sits at the table and Suzie is unable to observe his underwear situation (**U**). (Her Naïve Bayes model is not smoothed.)

11) [1] Without any further evidence, what is the probability that he does wear his underpants outside his pants (**P(U)**)?

Suzie observes that he does not wear a mask (**¬M**), nor does he wear a cape (**¬C**).

12) [3] What is the probability that he is good **P(Y|¬C, ¬M)**?