Quals questions given by Professor Nick McKeown, January 2002.

Question #1:
I want to represent a counter with 8 different values using 3 incandescent light bulbs. The lifetime of the light bulbs is determined by how often they are switched on and off. The more often they are switched on or off, the more likely they are to fail.

a. If I want to maximize the time between replacing a light bulb, what code should I use to represent the 8 different values of the counter?

Question #2:
It's common for a room light to be switched on and off by two or more different light switches.

a. If two different switches control a light, how are the switches wired up?
b. What if there are three switches?

Question #3:
Network switches and routers process packets to decide where to send them, and to modify packet headers. Sometimes, a conventional CPU (such as a MIPs or Intel processor) is used to process the stream of packets.

a. What do you think are the pros and cons of using a general-purpose processor for this application?
b. If you were to design a "packet-processor", how would it differ from a conventional processor?