**Q1:**

A university has asked you to create a model to predict the likelihood of a student passing a final exam based on their study habits and exam scores.  
Supposing that **study time** is your initial node/variable, come up with an algorithm to find probability of uncertainties (using conditional probability table), such as;

1. Exam score.
2. Probability of passing the final exam.

Assuming that student's study time influences their exam score, and their exam score influences their probability of passing the final exam, create a Bayesian solve-able scenario using **DAG (**Directed Acyclic Graph**)** with arrows representing the relations between each node.  
  
Hint: you can use the library **pomegranate** to generate distribution values and conditional probability table (mentioned in the lab examples).  
  
  
**Q2:**

Assuming that you have data on 1000 patients with 400 having a heart disease and 600 being fine.  
Computer the conditional probability of a person having a heart disease using the below table containing data for their age and cholesterol levels.

|  |  |  |
| --- | --- | --- |
| **Age** | **Heart Disease** | **High Cholesterol** |
| <40 | No | 100 |
| <40 | Yes | 150 |
| 40-60 | No | 150 |
| 40-60 | Yes | 255 |
| >60 | No | 150 |
| >60 | Yes | 250 |

**Q3:**

Suppose you’re a computer engineer tasked with finding the likelihood/probability of a system failure based on some variables/nodes, such as;

1 – CPU usage.

2 – Memory Usage.

3 – Disk Usage.

4 – Network Traffic.

5 – Operating system being used.

6 – Application type.

Assuming that the first 4 variables can hold 3 possible values (**low, med, high),** Operating system can either be **Windows** or **Linux,** and **app\_type** formed using conditional probability table consisting of **memory usage** and **operating system type.** Createa **DAG (**Directed Acyclic Graph**)** forming Bayesian network, and find the probability/likelihood of a system failure.  
  
The dependencies are as follows:

1 – CPU Usage, memory Usage, disk Usage, Operating system, and network traffic being parent nodes.

2 – application type being child node of CPU Usage, memory usage, disk usage, operating system, and network traffic.