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HW1-R-and-pyro.ipynb

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Causal inference with causal Bayesian networks bnlearn package and Pyro.ai

Note: This notebook contains both R and python code. Therefore, in order to run this notebook kernel and a python kernel configured in the jupyter notebook or jupyter lab session. The first p under an R kernel (with bnlearn and graphviz installed). The second part will run under a python

```
[1]: library(bnlearn)
```

```
Attaching package: 'bnlearn'


The following object is masked from 'package:stats':

    sigma
```

Utility functions for displaying symbolic and numerical co distributions

```
[2]: display.cpd.chart <- function(dag, iss.list){
         for( node in nodes(bn.bayes)){
             for(iss in iss.list){
                 bn.bayes <- bn.fit( dag, data= survey, method= "bayes", iss=iss)
                 bn.fit.barchart(bn.bayes[[node]], main = paste(node.names[[node]],
                                                   " (ISS=", iss, ")"
                 xlab =display.cpd.str(dag, node) , ylab = "Probability mass")
             }
         }
     }

     display.cpd.str  <- function( dag, node ){
         if( length(parents(dag, node)) == 0){
             paste("Pr(",node,")",sep="")
         } else {
             paste("Pr(",node,"|",paste(parents(dag,node), collapse=","),")", sep="
         }
     }
```

1 Building a DAG (4 points)

A DAG maps to a factorization of the joint distribution (e.g., $P(A, B, C) == P(A)P(B|A)P(C$