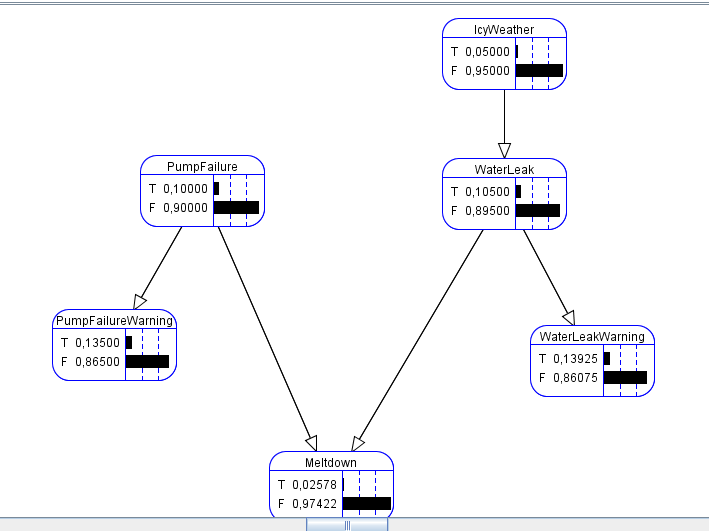
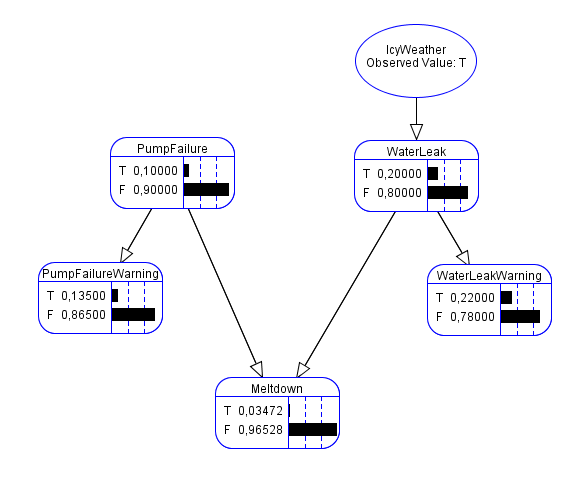
**Lab 3: Bayesian Networks**

**Part II**

Q5 -----

1. There is 2.58 % chance to melt down if no observation was made

If no observation is made, IcyWeather do not change anything but we just assume that there is IcyWeather, the plant has 3.47% chance to melt down.

1. If both sensor are failure, there is 14.5% chance to melt down, 20% if there is really a failure. The warning do not necessarily involve that there is a failure, that’s why chances are not the same to melt down.
2. Some variables are quite heavy to calculate because of too many variables or a doubt about the related variables. For example, Icy Weather depends could depend on the season, the temperature, etc.
3. It will change the range of value. Not a boolean anymore but a continuous value (+20, +21, +22, etc.)

Q6 -----

1. A bayesian netowrk represents a graph with nodes having a table describing probability depending on their parent nodes
2. Joint probability is the function calculating the probability of a given state. Here we have the following function :

P(False) = P(-IW)P(-WL|-IW)P(-PF)P(-PFW|-PF)P(-WLW|-WL)P(-MD|-PF^WL)

= 0.95 \* 0.9 \* 0.9 \* 0.95 \* 0.95 \* 0.999 = 0.6937 or 69.37 %   
That’s quite a common state

1. The probability of meltdown if there is a water leak and a pump failure is of 20% and nothing else change that fact because we already know the parent state, so this result cannot change.
2. P(MD = T)

P(MD = F)

Α = 1/ ( 0.0019 + 0.7 ) = 1.424

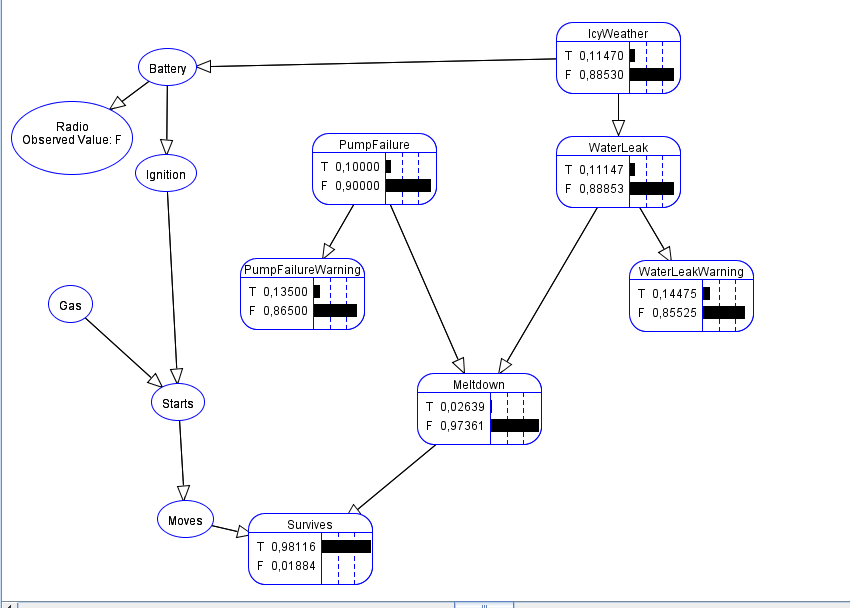
P(MD = T) = 1.424 \* 0.0019 = 0.0027

Alpha =

**PART III**

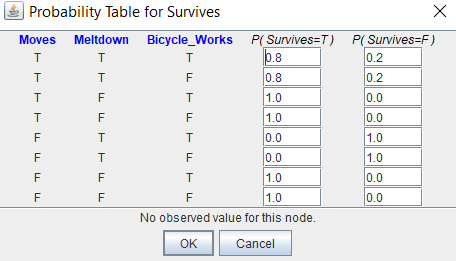
If the radio does not work, that’s probably because the battery do not work and if the battery do not work, the car can’t move and they will not survive

Probability of survives : 98.11%



Probability to survive with a bike improve a lot

Exact inference



**Question :** It is possible to model any function in propositional logic with Bayesian Networks. What does this fact say about the complexity of exact inference in Bayesian Networks? What alternatives are there to exact inference?

It is possible but the possible but the number of variables will affect a lot the complexity of the inference, that will be of , n being the number of variables. The alternative would be to decompose this function into several nodes only affected by the variables having an impact on the node.

**PART IV**

Q2 ------

In my model, if pomp failure is set to false (100% chance reliable), survives chance rise up to 99.46%

Mr H.S raise this probability to 93.5% so it’s better to change the pomp to a new one

By representing a human reaction, we suppose that the human do not change, can’t improve or get worse 