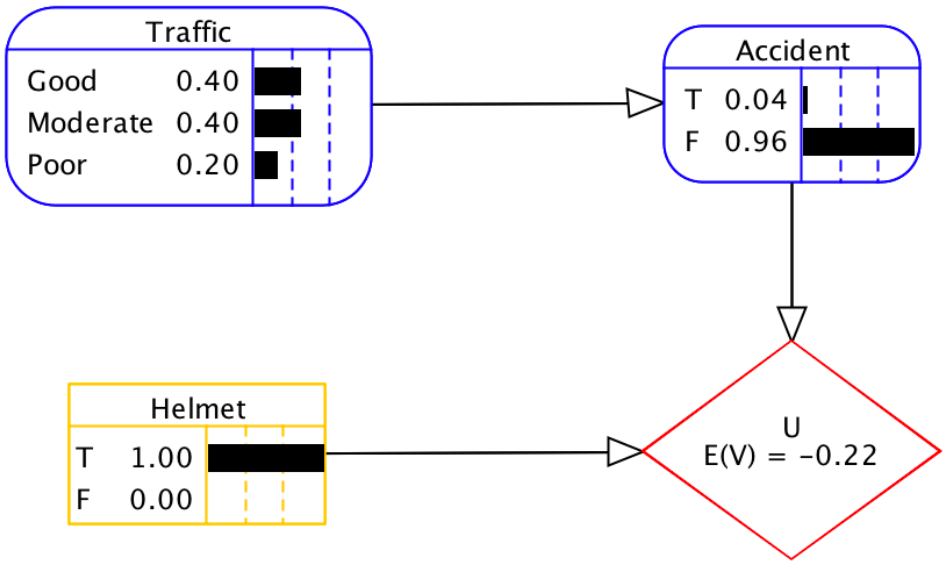
CS 486 A3 Q2

(a)

Decision network



Conditional probability table:

Probability Table for Traffic

	P(Traffic=Good)	*P(Traffic=Moderate)*	*P(Traffic=Poor)*
Prior Probability	0.4	0.4	0.2

No observed value for this node.

OK

Probability Table for Accident

Traffic	*P(Accident=T)*	*P(Accident=F)*
Good	0.01	0.99
Moderate	0.05	0.95
Poor	0.1	0.9

No observed value for this node.

OK

Utility function (I gave a little happiness when the biker can get on a bike without helmet LOL)

Utility Table for U

Accident	Helmet	Utility
T	T	-5.0
T	F	-10.0
F	T	0.0
F	F	0.1

OK

For my assumption above, the optimal decision is always put on a safety helmet.

Some sample calculation:
Without any information,

With helmet, E(U) = -0.22

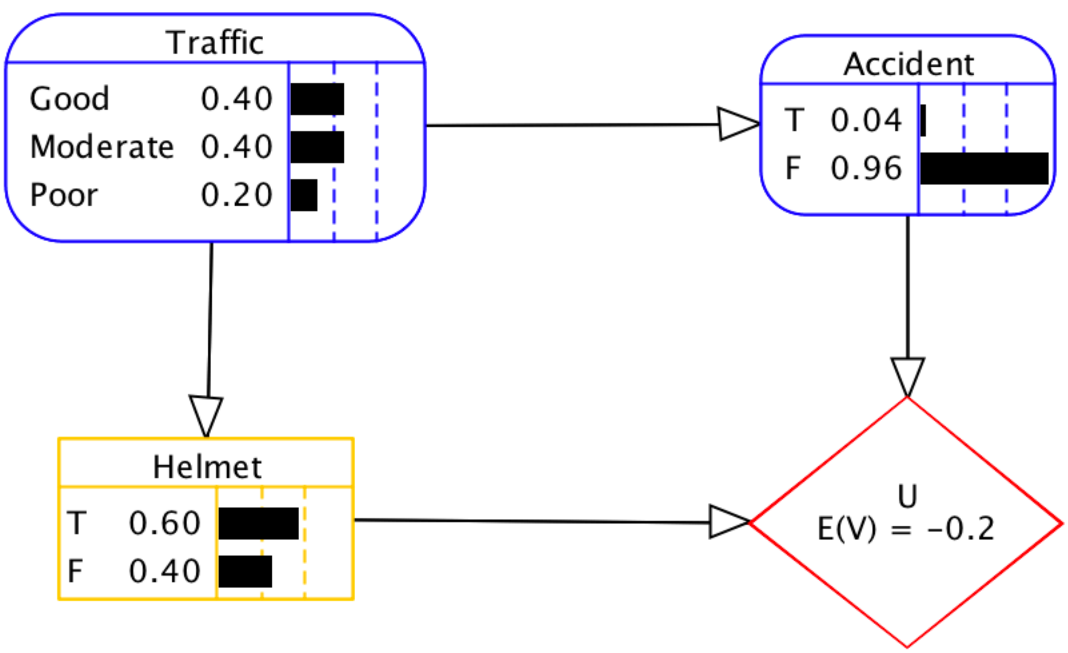
Without helmet, E(U) = -0.34

Hence it is better expected utility when we put on a safety helmet.

The general policy the biker should follow is to always put on a safety helmet to maximize the expected utility.

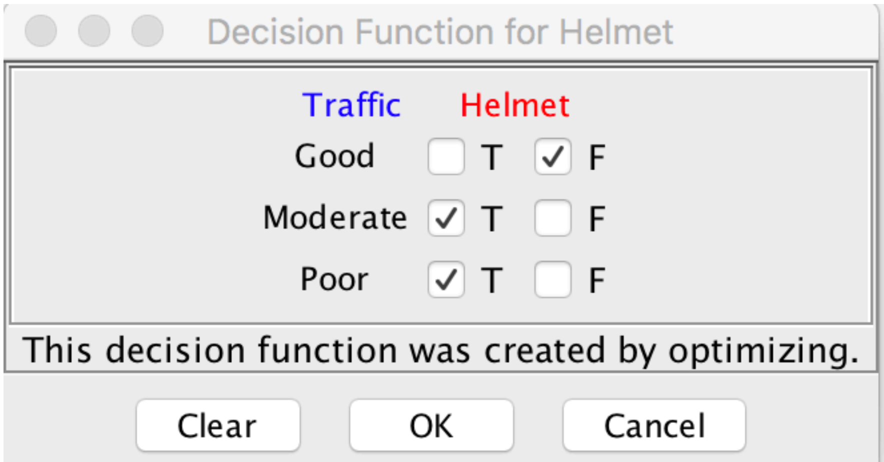
(b)

Decision network:



Conditional probability tables and utility function are all the same as in (a).

The optimal decision would be:



Some sample calculation:
For Traffic = Good,
    With helmet, E(U) = -0.05
    Without helmet, E(U) = 0

For Traffic = Moderate,
    With helmet, E(U) = -0.25
    Without helmet, E(U) = -0.4

Then the general rule would be: If the traffic is good, do not put on helmet. If it is not, put on helmet.

Value of buying the app = (-0.2) - (-0.22) = 0.02

It is worthwhile for me to buy the app, because it increases my expected utility.