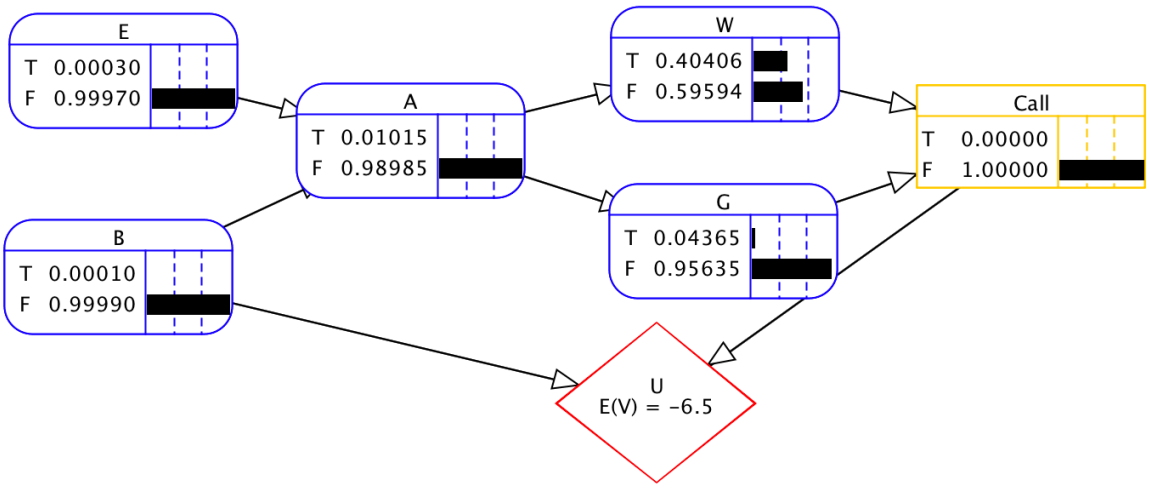
CS 486 A3 Q1

(a)

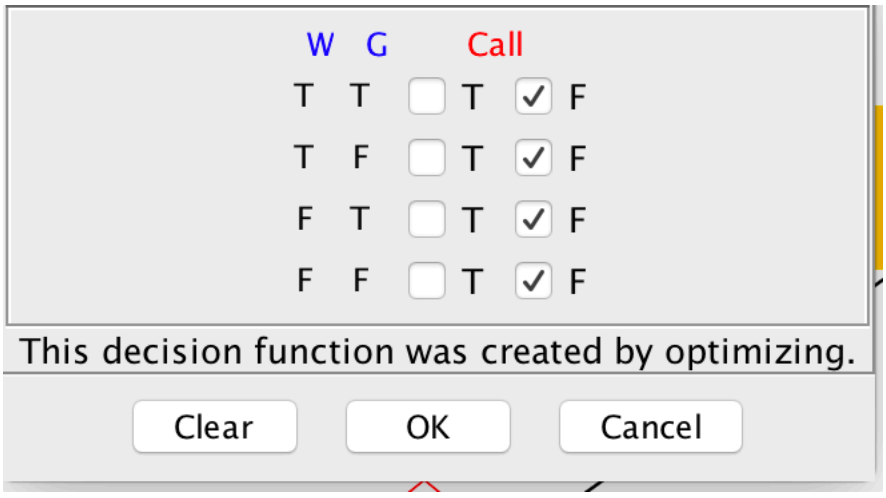
Decision network:



Utility function that I designed according to the question:

Call	B	Utility
T	T	-1000.0
T	F	-115.0
F	T	-65000.0
F	F	0.0

Optimal decision for each combinations of values for the evidence variable:



The general policy for maximizing expected utility is NOT to call police no matter what W and G are.

For example:

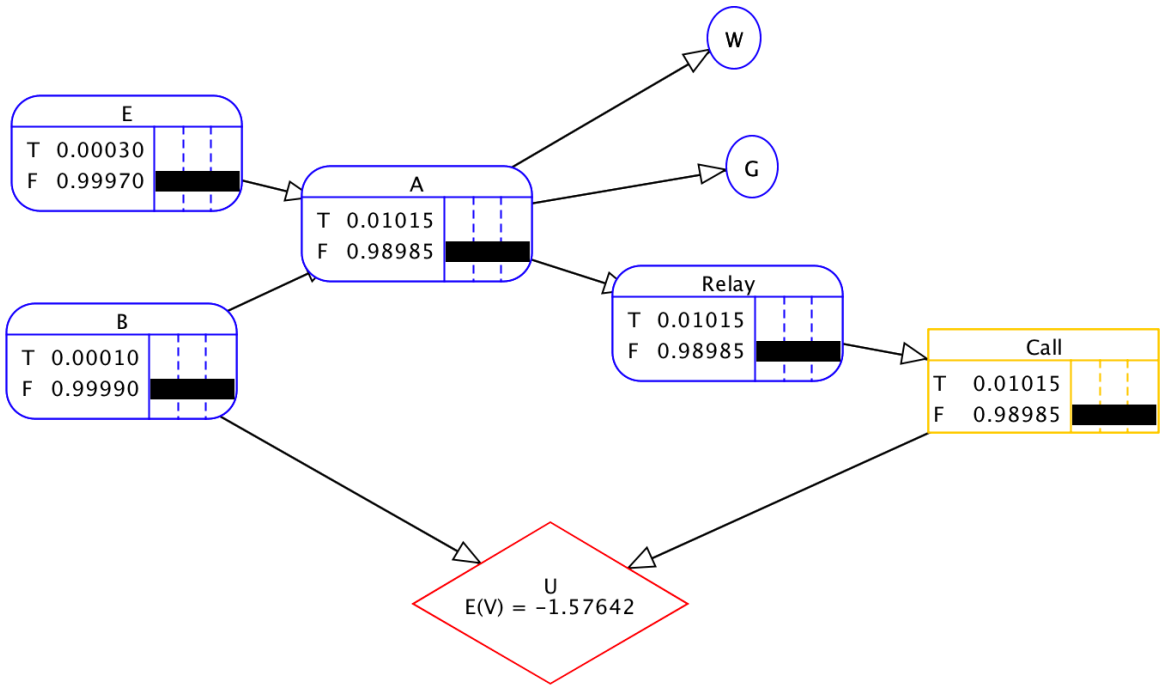
For W = true and G = true,
If we call the police, E(U) = -2.22185
But if we do NOT, E(U) = -1.98121

For W = true and G = false,
If we call the police, E(U) = -44.31412
But if we do NOT, E(U) = -3.0888

We can easily see that NOT calling police can always achieve better expected utility.

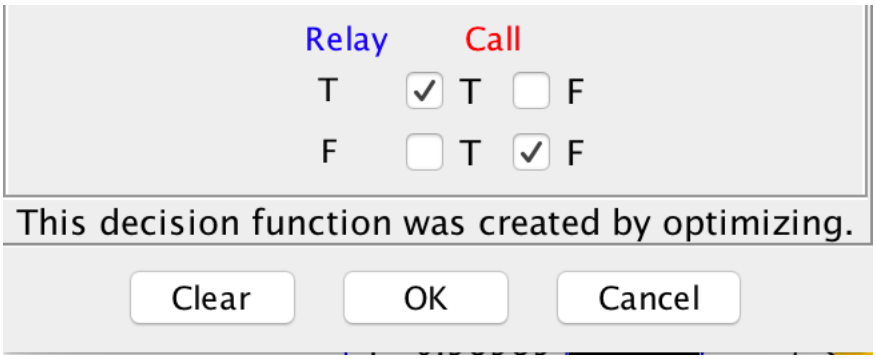
(b)

Decision network:



Utility function is the same as in (a).

Optimal decision:



The general policy is to call police when relay is true, NOT call police when relay is false.

For example:

For relay = true,
if call police, E(U) = -1.25144
if not, E(U) = -6.17502

For relay = false,
if call police, E(U) = -113.83706
if not, E(U) = -0.32498

As we can see, we need to follow the relay to decide if we call the police to maximize the expected utility.

Value of the relay = Expected utility WITH relay - Expected utility WITHOUT relay = (-1.57642) - (-6.5) = 4.92358