Nonso Iwu

Homework 2

CISC481

1

a.

**Init:**

On(Monkey, A) ∧ On(Banana, B) ∧ On(Box, C)   
∧ Moveable(Box)   
∧ Climbable(Box)   
∧ Height(Monkey, Low) ∧ Height(Box, Low) ∧ Height(Bananas, High)

b.

**Actions:**

Go(X, Y):

Precond: On(Monkey, X)

Effect: On(Monkey, Y) ∧ ~On(Monkey, X)

Push(O, X, Y):

Precond: Moveable(O) ∧ On(Monkey, X) ∧ On(O, X)

Effect: ~On(O, X) ∧ On(O, Y) ∧ ~On(Monkey, X) ∧ On(Monkey, Y)

ClimbUp(O):

Precond: Climbable(O) ∧ On(Monkey, X) ∧ On(O, X)

Effect: ~Height(Monkey, Low) ∧ Height(Monkey, High) ∧ OnTop(Monkey, O)

ClimbDown(O):

Precond: OnTop(Monkey, O) ∧ Height(Monkey, High)

Effect: ~Height(Monkey, High) ∧ Height(Monkey, Low) ∧ ~OnTop(Monkey, O)

Grasp(O):

Precond: On(Monkey, X) ∧ On(O, X) ∧ Height(Monkey, H) ∧ Height(O, H)

Effect: Grasping(Monkey, O)

Ungrasp(O):

Precond: Grasping(Monkey, O)

Effect: ~Grasping(Monkey, O)

2.

P(AR | AE, AH)   
= P(AR, AE, AH) **/** P(AE, AH)  
= ΣTE,DH P(AR, AE, AH, DH, TE) / ΣAR,DH,TE P(AR, AE, AH, DH, TE)

ΣTE,DH P(AR) \* P(AE|AR, TE) \* P(AH|AR, DH) \* P(DH) \* P(TE|AR)  
= P(AR) \* ΣTE P(TE|AR) \* P(AE|AR,TE) \* ΣDH P(DH) \* P(AH | AR, DH)  
= P(AR) \* **(** P(TE | AR) \* P(AE|AR, TE)   
 + P(~TE|AR) \* P(AE |AR,TE) \* ( P(DH) \* P(AH | AR, DH)   
 + P(~DH) \* P(AH | AR, ~DH) **)**  
= 0.001(0.0001 \* 0.1 + 0.9999 \* 0.99) \* (0.01 \* 0.1 + 0.99 \* 0.99)  
= 0.0009712

P(~AR|AE,AH)   
= P(~AR,AE,AH)/P(AE,AH)  
= ΣDH,TE P(~AR, DH, TE, AE, AH) / Σ~AR,DH,TE P(~AR, DH, TE, AE, AH)  
= ΣDH,TE P(~AR) \* P(DH) \* P(TE|~AR) \* P(AH|~AR, DH) \* P(AE | ~AR, TE)  
= P(~AR) \* ΣDH P(DH) \* P(AH|~AR, DH) ΣTE P(TE|~AR) \* P(AE|~AR, TE)  
= P(~AR) **(** P(DH) \* P(AH | ~AR, DH)   
 + P(~DH) \* P(AH | ~AR, ~DH) \* (P(TE | ~AR)  
 + P(TE | ~AR) \* P(AE | ~AR, TE)  
 + P(~TE|~AR) \* P(AE|~AR, ~TE)  
= 0.999 \* (0.01 \* 0.99 + 0.99 \* 0.00001)(0.01 \* 0.99 + 0.99 \* 0.00001)  
= 0.0000981

Alpha = 1/0.0009712+0.0000981   
= 0.0009712/ 0.0009712 + 0.0000981  
= 0.9083

3.

Remainder(A1)  
=(4/5) \* ( (-2/4)\*log2(2/4) – (2/4)\*log2(2/4) ) + (1/5)(-0-(1/1)\*log2(1/1) )  
=(0.8) \* ( -0.5 \* log2(0.5) – 0.5 \* log2(0.5) ) + (0.5)\*(-0-(1)\*log2(1) )  
=0.8

Remainder(A2)  
=(3/5) \* ( (-2/3)\*log2(2/3) – (1/3)\*log2(1/3) ) + (2/5)(-0-(2/2)\*log2(2/2) )  
= 0.551

Remainder(A3)  
=(2/5) \* ( (-1/2)\*log2(1/2) – (1/2)\*log2(1/2) ) + (3/5)(-(1/3)\*log2(1/3) - (2/3)\*log2(2/3) )  
=0.951

A2 -> (T: ?, F: False)

Remainder(A1)  
=(2/3) \* ( (-2/2)\*log2(2/2) – 0 ) + ( (1/3) \* (-0-(1/1)\*log2(1/1) )

Remainder(A3)  
=(1/3) \* ( (-1/1)\*log2(1/1) – 0 ) + (2/3)(-(1/2)\*log2(1/2) - (1/2)\*log2(1/2) )  
=0.667

A2 --> (T: A1, F: False)

A1 --> (T: True, F: False)