Key Sample-1 (Page 1 of 2)

A* SEARCH: S -> G

Expanded	Search Fringe (g+h=f)
S	H(5+6=11), K(3+9=12), B(8+6=14), I(8+7=15), C(10+7=17)
H	J(8+4=12), K(3+9=12), F(7+6=13), G(13+0=13), B(8+6=14) I(8+7=15), C(9+7=16)
J	E(10+2=12), K(3+9=12), F(7+6=13), G(13+0=13), B(8+6=14) I(8+7=15), C(9+7=16)
E	K(3+9=12), F(7+6=13), G(13+0=13), B(8+6=14), I(8+7=15) C(9+7=16)
K	F(7+6=13), G(13+0=13), B(8+6=14), I(8+7=15), C(9+7=16) K(10+9=19)
F	G(13+0=13), B(8+6=14), I(8+7=15), C(9+7=16), K(10+9=19) F(17+6=23)
G	[]
	Solution path: S -> H -> G

Key Sample-1 (Page 2 of 2)

Question 2: Alpha-Beta Minimax

A=14

B=14 **C=4**

D=14 **E=14** **F=4**

H=4 **I=14** **J=4** **K=14** **L=4** **M=3** **N=2** **O=5**

Pruned Nodes: G, N, O

Question 3: Decision Tree

Information Gain Computations:

Node: Temp

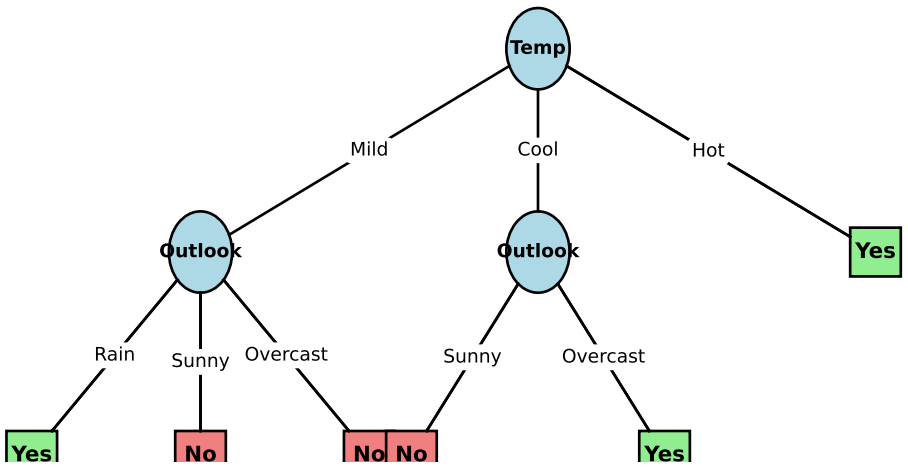
✓ Temp: 0.3601
Outlook: 0.2657
Wind: 0.1589

Node: Outlook

✓ Outlook: 0.9183
Wind: 0.2516

Node: Outlook

✓ Outlook: 1.0000
Wind: 1.0000



Question 4: First-Order Logic Translation

Predicates: Person(x), Knows(x, x), Likes(x, x), Friend(x, x)

a. English to First-Order Logic:

1. People like those who know them.

   Solution: $\forall x \, \forall y \, (Person(x) \land Person(y) \land Knows(y, x) \Rightarrow Likes(x, y))$

2. Everyone has at least one friend.

   Solution: $\forall x \, (Person(x) \Rightarrow \exists y \, (Person(y) \land Friend(x, y)))$

3. People who know each other are friends.

   Solution: $\forall x \, \forall y \, (Person(x) \land Person(y) \land Knows(x, y) \land Knows(y, x) \Rightarrow Friend(x, y))$

b. First-Order Logic to English:

1. $\forall x \, (Person(x) \Rightarrow \exists y \, (Person(y) \land Knows(x, y) \land Likes(x, y)))$

   Solution: Every person knows and likes at least one person.

2. $\exists x \, (Person(x) \land \forall y \, (Person(y) \land Knows(x, y) \Rightarrow Likes(y, x)))$

   Solution: There exists a person such that everyone who knows them likes them.

3. $\forall x \, \forall y \, (Person(x) \land Person(y) \land Friend(x, y) \Rightarrow \exists z \, (Person(z) \land Knows(x, z) \land Knows(y, z)))$

   Solution: For every pair of friends, there exists a person that both of them know.