Key Sample-3 (Page 1 of 2)

A* SEARCH: S -> G

Expanded	Search Fringe (g+h=f)
S	H(6+3=9), J(1+10=11), B(7+7=14)
H	J(1+10=11), G(12+0=12), D(10+2=12), E(10+4=14), B(7+7=14) K(10+8=18), I(13+7=20)
J	E(7+4=11), G(12+0=12), D(10+2=12), K(5+8=13), B(7+7=14) I(8+7=15)
E	D(10+2=12), G(12+0=12), K(5+8=13), E(10+4=14), B(7+7=14) I(8+7=15)
D	C(12+0=12), G(12+0=12), K(5+8=13), B(7+7=14), E(10+4=14) I(8+7=15), D(14+2=16)
C	G(12+0=12), K(5+8=13), B(7+7=14), E(10+4=14), I(8+7=15) D(14+2=16)
G	[]
	Solution path: S -> H -> G

Key Sample-3 (Page 2 of 2)

Question 2: Alpha-Beta Minimax

A=11

B=11 **C=11**

D=14 **E=11** **F=11**

H=6 **I=14** **J=11** **K=5** **L=6** **M=11** **N=8** **O=4**

Pruned Nodes: G, N, O

Question 3: Decision Tree

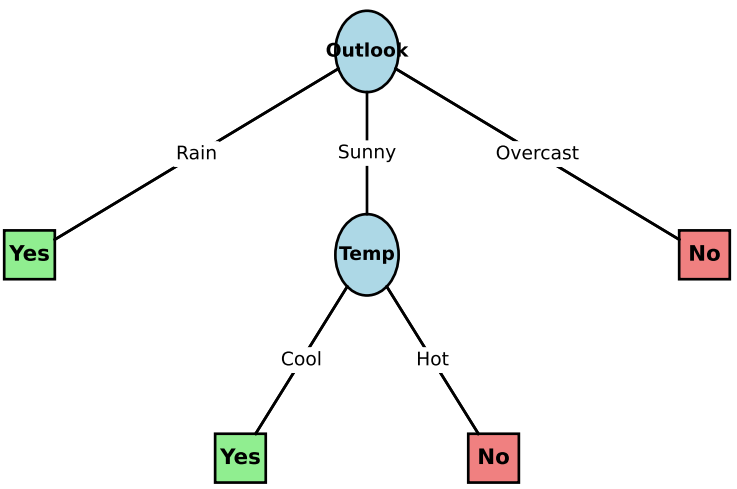
Information Gain Computations:

Node: Outlook

✓ Outlook: 0.6101
Temp: 0.3601
Wind: 0.0488

Node: Temp

✓ Temp: 0.9183
Wind: 0.2516



Question 4: First-Order Logic Translation

Predicates: Hospital(x), Doctor(x), WorksAt(x, x), Specialist(x)

a. English to First-Order Logic:

1. Every hospital has doctors.

   Solution: $\forall x\ (Hospital(x) \Rightarrow \exists y\ (Doctor(y) \wedge WorksAt(y, x)))$

2. Specialists work at hospitals that have other specialists.

   Solution: $\forall x\ (Doctor(x) \wedge Specialist(x) \Rightarrow \exists y\ (Hospital(y) \wedge WorksAt(x, y) \wedge \exists z\ (Doctor(z) \wedge Specialist(z) \wedge WorksAt(z, y) \wedge \neg(x=z))))$

3. There is a hospital where all doctors are specialists.

   Solution: $\exists x\ (Hospital(x) \wedge \forall y\ (Doctor(y) \wedge WorksAt(y, x) \Rightarrow Specialist(y)))$

b. First-Order Logic to English:

1. $\forall x\ (Hospital(x) \Rightarrow \exists y\ (Doctor(y) \wedge WorksAt(y, x) \wedge Specialist(y)))$

   Solution: Every hospital has at least one doctor who is a specialist.

2. $\exists x\ (Doctor(x) \wedge Specialist(x) \wedge \forall y\ (Hospital(y) \wedge WorksAt(x, y) \Rightarrow Specialist(x)))$

   Solution: There exists a specialist such that if they work at any hospital, then they are a specialist.

3. $\forall x\ \forall y\ (Doctor(x) \wedge Hospital(y) \wedge WorksAt(x, y) \Rightarrow \exists z\ (Doctor(z) \wedge WorksAt(z, y) \wedge \neg(x=z)))$

   Solution: For every doctor at a hospital, there exists another doctor at the same hospital.