

Tutorial 6:

Search and probabilistic reasoning

Question 1

- a) Communication, Emotion (sensing and displaying),
- b) Chess, Logic, Mathematics
- c) Something involving the following terms: thought processes, reasoning, rationality, behaviour, performance, decision making, problem solving, logic
- d) Making computers think, study of intelligence, design of intelligent agents, ...

Question 2

- a) DHKNP
- b) HNDKP
- c) HDK
- d) D HDK HNDKP

Question 3

a)

A(10) [initial node is A with $h=10$, expand to B, C, D, and E]

B(9); C(2); D(6); E(4) [sort to C, E, D, B]

C(2); E(4); D(6); B(9) [best node is C with $h=2$, expand, dead end]

E(4); D(6); B(9) [best node is E with $h=4$, expand to K and L, keep D and B on list]

D(6); B(9); K(3); L(2) [sort to L, K, D, B]

L(2); K(3); D(6); B(9) [best node is L with $h=2$, expand to P, keep K, D, and B on list]

K(3); D(6); B(9); P(0) [sort to P, K, D, B]

P(0); K(3); D(6); B(9) [best node is P with $h=0$ -> goal reached]

Nodes visited in chosen path are A, E, L, P resulting in a path cost of $10+3+3=16$

b)

A($0+10=10$) [initial node is A, $h=10$, $g=0$, $f=10$, expand to B, C, D, and E]

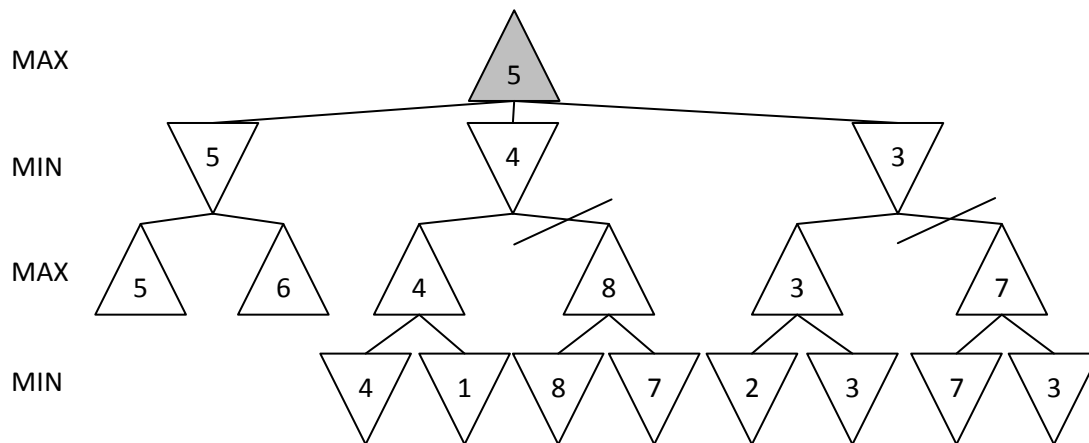
B($2+9=11$); C($1+2=3$); D($7+6=13$); E($10+4=14$) [sort to C, B, D, E]

C($1+2=3$); B($2+9=11$); D($7+6=13$); E($10+4=14$) [best node is C, $h=1$, $g=2$, $f=3$, expand, dead end]

B(2+9=11); D(7+6=13); E(10+4=14) [best node is B, h=2, g=9, f=11, expand to F, G, H]
D(7+6=13); E(10+4=14); F(4+7=11); G(8+6=14); H(8+6=14) [sort to F, D, E, G, H]
F(4+7=11); D(7+6=13); E(10+4=14); G(8+6=14); H(8+6=14) [best is F, expand, dead end]
D(7+6=13); E(10+4=14); G(8+6=14); H(8+6=14) [best is D, expand to I and J]
E(10+4=14); G(8+6=14); H(8+6=14); I(10+4=14); J(11+2=13) [sort to J, E, G, H, I]
J(11+2=13); E(10+4=14); G(8+6=14); H(8+6=14); I(10+4=14) [best node is J, expand to O]
E(10+4=14); G(8+6=14); H(8+6=14); I(10+4=14); O(13+0=13) [sort to O, E, G, H, I]
O(13+0=13); E(10+4=14); G(8+6=14); H(8+6=14); I(10+4=14) [best node is O -> goal reached]

Nodes visited in chosen path are A, D, J, O resulting in a path cost of 7+4+2=13

Question 4



Question 5

Random variable: G for sound –G for faulty; T1 for sound –T1 for faulty

$$P(G) = 0.92$$

$$P(-G) = 0.08$$

$$P(T1 | G) = 0.84$$

$$P(-T1 | G) = 0.16$$

$$P(T1 | -G) = 0.06$$

$$P(-T1 | -G) = 0.94$$

Want to find $P(-G | T1)$

$$P(-G | T1) = (P(T1 | -G)P(-G)) / P(T1)$$

$$P(T1) = P(T1 | G)P(G) + P(T1 | -G)P(-G)$$

$$= 0.84 \times 0.92 + 0.06 \times 0.08 = 0.7728 + 0.0048 = 0.7776$$

$$P(-G | T1) = P(T1 | -G)P(-G) / P(T1)$$

$$= 0.06 \times 0.08 / 0.7776 = 0.0061728$$