ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

QUIZ 3 **WINTER SEMESTER, 2021-2022**

DURATION: 20 Minutes **FULL MARKS: 15**

CSE 4711: Artificial Intelligence

Answer all **2 (two)** questions. Marks of each question and corresponding CO and PO are written in the right margin with brackets.

Student ID: _____

1. In the game tree shown in Figure 1, an up triangle (△) represents a maximizer node, a down triangle (▽) represents a minimizer node, a circle (○) represents a chance node, and a square (□) represents a terminal node. The value beside the arcs indicate the probability of taking the corresponding action. In the event of a tie, the left action is taken. Here, P and Q are whole numbers.

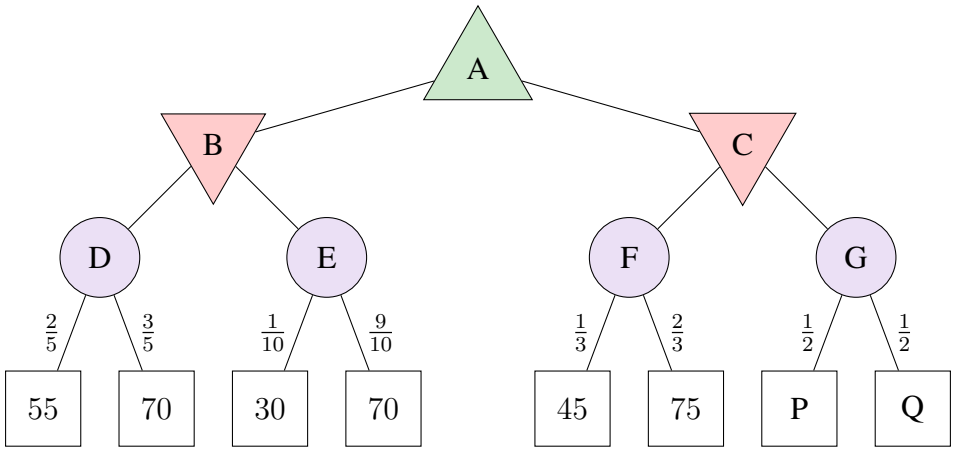

Figure 1: Game Tree for Question 1

Assume that the players play optimally. Now answer the following questions:

a) Determine the value of the nodes that do not depend on P and Q. 4 (CO1) (PO1)

Solution: $V(\mathrm{D}) = \frac{2}{5} \times 55 + \frac{3}{5} \times 70 = 64$
$V(\mathrm{E}) = \frac{1}{10} \times 30 + \frac{9}{10} \times 70 = 66$
$V(\mathrm{F}) = \frac{1}{3} \times 45 + \frac{2}{3} \times 75 = 65$
$V(\mathrm{B}) = \min(64, 66) = 64$

Rubric:

- 1 point for each value.

b) With a brief explanation, determine the condition(s) that P and Q must satisfy for the following scenarios: $4 + 5$ (CO1) (PO1)

i. The game will progress towards C.

Solution: For A to pick C over B,

$$\begin{aligned} & V(\mathrm{C}) > V(\mathrm{B}) \\ \Rightarrow & \min\left(V(\mathrm{F}), V(\mathrm{G})\right) > 64 \\ \Rightarrow & \min\left(65, \frac{\mathrm{P}+\mathrm{Q}}{2}\right) > 64 \\ \Rightarrow & \frac{\mathrm{P}+\mathrm{Q}}{2} > 64 \\ \Rightarrow & \mathrm{P}+\mathrm{Q} > 128 \end{aligned}$$

Rubric:

- 1 point for the correct initial relation
- 2 points for the steps
- 1 point for the correct lower bound

ii. The game will progress towards G.

Solution: From the previous question, to get to C, we need $\mathrm{P}+\mathrm{Q} > 128$.
For C to pick G over F,

$$\begin{aligned} & V(\mathrm{G}) < V(\mathrm{F}) \\ \Rightarrow & \frac{\mathrm{P}+\mathrm{Q}}{2} < 65 \\ \Rightarrow & \mathrm{P}+\mathrm{Q} < 130 \end{aligned}$$

Combining the two equations, we get: $128 < \mathrm{P}+\mathrm{Q} < 130$.
Since P and Q are whole numbers, $\mathrm{P}+\mathrm{Q} = 129$.
Rubric:

- 1 point for the correct initial relation
- 2 points for the steps
- 1 point for the correct upper bound
- 1 point for the exact value

2. A meme is an image, video, piece of text, etc., typically humorous in nature, that is copied and spread rapidly by internet users, often with slight variations. 2

   Create a meme related to this course. A text description will suffice.

Solution:


AI MEMES
ME
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