School of Information Technology, Deakin University

SIT320 — Advanced Algorithms

Pass Task — **Introduction**

At the completion of the module (**Module: Introduction**), you are required to fill a lesson review by doing following activities.

Your tutor will then review your submission and will give you feedback. If your submission is incomplete they will ask you to include missing parts. They can also ask follow-up questions, either to clarify something, or to double check your understanding of certain concepts.

Task List

- **(0)** First thing first — print and fill the **SIT320 - Planning Form** (download from modules download section) and sign it if you are okay with the deadlines. If not, discuss with your tutor, so that we can come-up with a different plan for you. Note, this is not a binding document, the intention here is to make you plan for the unit.

- **(1)** Design and write a pseudo-code for tic-tac-toe's algorithm. You can also record a video (on panopto) (like that of Gaurav Sen) of you explaining your strategy.

- **(2a)** Provide evidence that you have the Anaconda Navigator installed. **(2b)** Provide evidence that you have created a new environment on your machine called SIT320. **(2c)** Provide evidence that you have executed a basic Python code with some while and if statements.

- **(3)** In lights of our discussion of complexity theory, discuss what is the algorithmic complexity of your tic-tac-toe algorithm? Discuss your solution in the context of P and NP. Your solution should convey your understanding of algorithmic complexity as well as complexity theory.

- **(4)** The tic-tac-toe code given to you has an issue. For example, it will not choose an action which results in immediate winning of the game, and instead at each step explore the entire tree. Modify the code to fix this.

- **(5) (Only for D and HD students)** — The algorithm that we have discussed so far for tic-tac-toe is called the minimax algorithm. There is a variant of minimax called the Expectiminimax. You are expected to do an online research about Expectiminimax algorithm, and differentiate it from minimax algorithm to highlight its salient features. Discuss how this will improve your the minimax algorithm. Provide some insights on alpha-beta pruning and discuss it in the context of bigger games like backgammon and chess.

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