MATHEMATICAL LOGIC — ASSIGNMENT TWO

(1) Prove $\vdash (\forall x.\, A \supset B) = ((\exists x.\, A) \supset B)$ when $x \notin \mathsf{FV}(B)$. Show a counterexample when $x \in \mathsf{FV}(B)$.
(2) State the Downward Löwenheim-Skolem Theorem.
(3) Show that there is an alternative model of the rational numbers in which $\sqrt{2}$ is rational (Hint: use the decimal expansion of $\sqrt{2}$).

Each question is worth 12 points. The points in all the four assignments will be added together and the result will be divided by 4, and this will be the final result. Remember to mark your answer sheet with your name.

Date: May 2nd 2022.