

Mid-Semester Exam: Question 1

Time: 10:00 am - 10:30 am

Q1. (a) Let $A = \{x \in \mathbb{R} : x^3 + x < 1\}$. Show that the set A is bounded above. If $a = \sup A$, then show that $a^3 + a = 1$. **[7 marks]**

(b) Let $a_1 = 1$ and $a_{n+1} = \left(1 + \frac{(-1)^n}{2^n}\right)a_n$, for $n \in \mathbb{N}$. Show that the sequence (a_n) is convergent. **[8 marks]**