

LA Session - Proofs, Sets

- 1) For all integers n , prove that $n(3n+1)$ is an even integer.
- 2) Given a set of n positive real numbers a_1, a_2, \dots, a_n , where $n > 1$, with an average of b , prove that the value of the largest element in the set is strictly less than bn .
- 3) Let $S = \{1, 4, 7, 9\}$ and $T = \{1, 2, 7, 8\}$. Explicitly list the members of the following sets: $S \cup T, S \cap T, S - T, S \times T, T \times S, \wp(S)$ and $\wp(T)$.
- 4) Use set laws to prove that the two following sets are equivalent.

$$(1) A \cup B$$

$$(2) (A \cap B) \cup (A \cap \bar{B}) \cup (\bar{A} \cap B)$$

- 5) Let A, B and C be arbitrary sets taken from the positive integers.

Prove or disprove: If $A \cap B \cap C = \emptyset$, then $(A \subseteq \bar{B}) \vee (A \subseteq \bar{C})$.