MACM 101 Chapter 1.4

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1 A Not Subset of B

$A \nsubseteq B = \neg(A \subseteq B)$
$= \neg\forall x \in A \implies x \in B$
$\exists\neg(x \in A \implies x \in B)$
$\exists\neg(\neg x \in A \vee x \in B)$
de morgans
$x \in A \wedge \neg x \in B$
$x \in A \wedge x \notin B$

2 $\emptyset$ is a subset of every set

The empty set is a subset of A unless there is some elemnt in $\emptyset$ that is not in A.

So if $\emptyset$ is not a subset of A then there is an element in $\emptyset$.

But, $\emptyset$ has no elements and hence this is a contradiction, so the $\emptyset$ must be a subset of A