

1. Since $A = \phi$ and the cartesian product of any set with empty set is empty set $\therefore A \times B = \phi$
2. 1
 - (a) p1 not hold (this will work if $k=i$)
 - (b) p2 not hold (since $A_i \subseteq A_{i+1}$, A_{i+1} could have different element form A_i)
 - (c) p3 hold (since $A_i \neq A_{i+1}$ and $i = [0, \infty)$)
 - (d) p4 not hold (this only holds only if $A_i = A_{i+1}$)
 - (e) p5 not hold (what if $A_i = A_{i+1}$)
 - (f) p6 hold (the union of infinite set could only be infinite)