Q3) to prove the inequality is true we will use induction.

$\boxed{1}$ base case: $n=1$

$\Rightarrow 1-\sum_{i=1}^{1} a_i \leq \prod_{j=1}^{1} (1-a_j)$

$\Rightarrow 1-a_1 \leq 1-a_1$

$\Rightarrow 1 \leq 1$

$\boxed{2}$ Inductive hypothesis: for any $k \leq n$, $1-\sum_{i=1}^{k} a_i \leq \prod_{j=1}^{k} (1-a_j)$

$\boxed{3}$ Inductive Step: prove $k+1$:

$$1-\sum_{i=1}^{k+1} a_i \leq \prod_{j=1}^{k+1} (1-a_j)$$

$$\Rightarrow 1-\sum_{i=1}^{k} (1-a_j) - a_{k+1} \leq (1-a_{k+1}) \prod_{j=1}^{k} (1-a_j)$$

$$\Rightarrow 1-\sum_{i=1}^{k} (1-a_j) - a_{k+1} \leq \prod_{j=1}^{k} (1-a_j) - a_{k+1} \prod_{j=1}^{k} (1-a_j$$

because $1-\sum_{i=1}^{k} (1-a_j) \leq \prod_{j=1}^{k} (1-a_j$, make $1-\sum_{i=1}^{k} (1-a_i) = \prod_{j=1}^{k} (1-a_j)$

$$\Rightarrow \prod_{j=1}^{k} (1-a_j) - a_{k+1} \leq \prod_{j=1}^{k} (1-a_j) - a_{k+1} \prod_{j=1}^{k} (1-a_j)$$

$$-a_{k+1} \leq -a_{k+1} \prod_{j=1}^{k} (1-a_j)$$

$$-1 \leq -\prod_{j=1}^{k} (1-a_j)$$

since $a_i$ is always less than 1, $\prod_{j=1}^{k} < 1$

$\therefore$ thus since it works for any $k+1$, we have proved the inequality