ii) $\det(I+A) \neq 0 \Rightarrow (I+A)^{-1}$ exists and is of same order as A (ie $n \times n$).
$I - A$ is an $n \times n$ matrix $\therefore$
$(I-A)(I+A)^{-1}$ is defined, and is an n by n matrix

For any othogonal matrix B, $B^{-1} = B^T$

$$I + A^T A = I + A^T A$$
$$I + (A + A^T) + A^T A = I - (A^T + A) + A^T A$$
$$(I + A^T)(I + A) = (I - A^T)(I - A)$$
$$(I + A)^T (I + A) = (I - A)^T (I - A)$$

Multiply on left by $((I+A)^T)^{-1}$
on right by $(I-A)^{-1}$

$$(I+A)(I-A)^{-1} = ((I+A)^T)^{-1}(I-A)^T = ((I+A)^{-1})^T (I-A)^T$$

By properties of inverse and transposition

$$((I-A)(I+A)^{-1})^{-1} = ((I-A)(I+A)^{-1})^T$$