4. (a) if we want converge.

$$\cancel{\log(A)_{k+1}} \quad \cancel{\log(A)_{k}} \quad -\frac{(I-A)^{k+1}}{k+1} < \frac{-(I-A)^{k}}{k}$$

$$\frac{-(I-A)^{k+1}}{k+1} = \frac{-(I-A)^{k}}{k} \cdot (I-A) \cdot \frac{k}{k+1} \Rightarrow$$

$$\frac{k}{k+1}(I-A) < 1 \Rightarrow \|I-A\| < \frac{k}{k+1}$$

(b) For each $(I-A)$, Computational complexity is n^2.
For each $(I-A)\cdot(I-A)$. Computational complexity is n^3.

For $k=1$, $O(n) = n^2$

$k=2$, $O(n) = 2n^2 + n^3$

$k=k$, $O(n) = kn^2 + (k-1)n^3$

Total computational compexity $= \frac{(k+1)\cdot k}{2} n^2 + \frac{(k-1)k}{2} \cdot n^3$.