Problem 1:  Gell-Mann Nishijima equation

Check that the Gell-Mann Nishijima formula works for the quarks $u$, $d$, and $s$.

What are the appropriate isospin assignments for $\bar{u}$, $\bar{d}$, and $\bar{s}$? Check you answer with the Gell-Mann Nishijima formula.

Problem 2:  The alpha particle

The $\alpha$ particle is a bound state of two protons and two neutrons, that is, a $^4\text{He}$ nucleus. There is no isotope of hydrogen with an atomic weight of four ($^4\text{H}$), nor of lithium $^4\text{Li}$. What do you conclude about the isospin of an $\alpha$ particle?

The reaction $d + d \rightarrow \alpha \pi^0$ has never been observed. Explain why.
Would you expect $^4\text{Be}$ to exist? How about a bound state of four neutrinos?