A case-control study of presenile dementia identified 176 clinically diagnosed patients aged below 65 years from hospital records. Each case was individually paired with a community-sampled control of the same sex and age. Steps were taken to ascertain that each of the controls did not suffer from dementia. One of the risk factors explored in this study was family history of dementia. We wish to determine whether there is an association between occurrence of presenile dementia and a family history of dementia.

The results of this study are summarized in the table below:

|  |  |  |
| --- | --- | --- |
| Family history of dementia in cases | Family history of dementia in controls | |
| Present | Absent |
| Present | 30 | 55 |
| Absent | 25 | 66 |

a). What are the null and alternative hypotheses?

b) Perform an appropriate statistical procedure to test these hypotheses using a type I error level of 0.01.

c) Provide a brief interpretation of your results.

**Bonus Question 3 (1 point)**

Iron-deficiency anemia is an important nutritional health problem in the US. A dietary assessment was performed on sixty-one 9- to 11- year old male children whose families were below the poverty level. The mean daily iron intake among these 61 children was found to be 13.28 mg with standard deviation 6.35 mg. Suppose that the mean daily iron intake among a large population of 9- to 11- year old boys from all income strata is 12.56 mg (we’ll trust the government statistics this one time :-). We wish to test if the mean iron intake among the low income group is different from that of the general population. Assume that the variable “iron intake level” is normally distributed.

Use the ***confidence interval approach*** to make a decision as to whether the iron intake of the low-income family boys is different from that of the general population and provide a sentence (or two) with your interpretation to the readers of a scientific journal.