Statistics 101 – More Examples of Tests of Hypotheses

1. People who work in smelting operations (where raw ore is turned into metal) are exposed to strong electromagnetic fields. A study done in Norway looked at the proportion of male births for women who worked in smelting operations. In Norway as a whole 51.4% of all births are males. Of 204 women randomly selected from all women who worked in smelting operations and who gave birth to a baby, 92 gave birth to males. We are interested in seeing if the proportion of male births for women in Norway who work in smelting operations is less than that for all women in Norway.

   a) Set up the appropriate null and alternative hypotheses. Be sure to define in words what the population proportion is.

   b) Verify that the success/failure condition for statistical inference is met.

   c) Compute the value of the test statistic and the associated P-value.

   d) Use the P-value to make a decision.

   e) State your conclusion within the context of the problem.

   f) [3] Is the difference in the proportion of male births caused by the strong electromagnetic fields? Explain briefly.
2. In the 1980’s it was generally believed that about 5% of all children in the U. S. were affected by congenital abnormalities. Some people believe that the increase in chemicals in the environment has led to an increase in the proportion of children in the U. S. with congenital abnormalities. A recent study examined 384 randomly selected children in the U. S. and found that 26 had congenital abnormalities. The conditions for doing a test of hypothesis are met, so you do not need to verify them.

   a) What is the population? Be specific.

   b) What is the sample? Be specific.

   c) What is the population parameter of interest?

   d) Give a null and alternative hypothesis for the population parameter.

   e) Compute the value of the test statistic and convert this to a P-value.

   f) Use the P-value to make a decision whether or not to reject the null hypothesis.

   g) State a conclusion, within the context of the problem.