1. A random sample of soil specimens was taken from a large geographic area. The specimens can be assumed to be independent. The amount of organic matter, as a percent, was determined for each specimen. The data are below:

$$0.14,\ 0.32,\ 1.17,\ 1.45,\ 3.5,\ 5.02,\ 5.09,\ 5.22$$

   A soil scientist wants to know whether the population mean percent organic matter is different than 4%. A significance level of $\alpha = 0.05$ is chosen.

   (a) State hypotheses appropriate to the research question.

   (b) Graph the data as you see fit. Why did you choose the graph(s) that you did and what does it (do they) tell you?

   (c) Regardless of your conclusion from part (b), use a T-test to perform a test of the hypotheses you stated in (a). Compute the p-value, and make a reject or not reject conclusion. Then state the conclusion in the context of the problem. In other words, does it seem the mean organic matter level is different than 4%?

2. A study is conducted regarding shatterproof glass used in automobiles. Twenty-six glass panes are coated with an anti-shattering film. Then a 5-pound metal ball is fired at 70mph at each pane. Five of the panes shatter. We wish to determine whether, in the population of all such panes, the probability the glass shatters under these conditions is different from $\pi = 0.2$.

   (a) State the appropriate null and alternative hypotheses.

   (b) Check the conditions for trusting the conclusion of the test, and calculate the observed value of an appropriate test statistic.

   (c) Calculate the rejection region and draw a conclusion, given the significance level $\alpha = 0.05$.

   (d) Calculate the p-value.