STAT 2122: Homework#8 (covers Section 8.1-8.4)

1. The melting point of each of 16 samples of a certain brand of hydrogenated vegetable oil was determined, resulting in $\bar{x} = 94.32$. Assume that the distribution of the melting point is normal with $\sigma = 1.20$.

Question: Test $H_0 : \mu = 95$ versus $H_a : \mu \neq 95$ using a two-tailed level 0.01 test.

2. To obtain information on the corrosion-resistance properties of a certain type of steel conduit, 45 specimens are buried in soil for a 2-year period. The maximum penetration (in mils) for each specimen is then measured, yielding a sample average penetration of $\bar{x} = 52.7$ and a sample standard deviation of $s = 4.8$. The conduits were manufactured with the specification that true average penetration be at most 50 mils. They will be used unless it can be demonstrated conclusively that the specification has not been met. What would you conclude?

3. A sample of n sludge specimens is selected and the pH of each one is determined. The one-sample t test will then be used to see if there is compelling evidence for concluding that true average pH is less than 7.0. What conclusion is appropriate in each of the following situations?

(a) $n = 6$, $t = -2.3$, $\alpha = 0.05$

(b) $n = 15$, $t = -3.1$, $\alpha = 0.01$

(d) $n = 6$, $t = 0.7$, $\alpha = 0.05$

(e) $n = 6$, $\bar{x} = 6.68$, $s/\sqrt{n} = 0.0820$

4. The accompanying data on cube compressive strength (MPa) of concrete specimens appeared in the article *"Experimental Study of Recycled*

Rubber-Filled High-Strength Concrete" (Magazine of Concrete Res., 2009: 549–556):

112.3	97.0	92.7	86.0	102.0
99.2	95.8	103.5	89.0	86.7

Suppose the concrete will be used for a particular application unless there is strong evidence that true average strength is less than 100 MPa. Should the concrete be used? Carry out a test of appropriate hypotheses.