HW-Ch.9

Q1. The article "Ozone for removal of acute toxicity from logyard run-off" (M. Zenaitis and S Duff, 2202, *Ozone Science and Engineering*, 83-90) presents chemical analyses of runoff water from sawmills in British Columbia. Included were measurements of pH for six water specimens: 5.9, 5.0, 6.5, 5.6, 5.9, and 6.5. Experience says that this type of pH content follows a normal distribution. Derive a 95% confidence interval for the true mean pH. Would you modify the method of estimation if sample size were large?

Q2. The pH content of runoff water from sawmills in British Columbia is considered. **Six** water specimens produce a mean of 5.5. Experience says that this type of pH content follow normal distribution with standard deviation 0.81. Derive a 95% confidence interval for the true mean pH. Would you modify the method of estimation if sample size were large?

Q3. The pH content of runoff water from sawmills in British Columbia is considered. **Thirty** water specimens produce a mean of 5.5. Experience says that this type of pH content follow normal distribution with standard deviation 0.81. Derive a 95% confidence interval for the true mean pH.

Q4. The pH content of runoff water from sawmills in British Columbia is considered. **Thirty** water specimens produce a mean of 5.5 and standard deviation 0.81. Derive a 95% confidence interval for the true mean pH.

Q5. Concentrations of atmospheric pollutants such as carbon monoxide (CO) can be measured with a spectrophotometer. In a calibration test, 40 measurements were taken of a laboratory gas sample that is known to have a CO concentration of 80 parts per million (ppm). A measurement is considered to be satisfactory if it is within 5 ppm of the true concentration. Of the 40 measurements, 36 were satisfactory.

   a. What proportion of the sample measurements was satisfactory?
   b. Derive a 95% confidence interval of the proportion of measurements made by this instrument that will be satisfactory.
   c. How many measurements must be taken to specify the proportions of satisfactory measurements to within ±0.10 with 95% confidence

Q6. In a test of the effect of dampness on electric connection, 100 electric connections were tested under damp conditions and 150 were tested under dry conditions. Twenty of the damp connections failed and only 10 of the dry ones failed. Derive a 95% confidence interval for the difference between the proportions of connections that fail when damp as opposed to dry.

Q7. A machine is used to fill plastic bottles with bleach. A sample of 18 bottles had a mean fill volume 0f 2.006 Liters and a standard deviation of 0.011 Liters. The machine was then moved to another location. A sample of 10 bottles filled at the new location had a mean fill volume of 2.001 Liters and a standard deviation of 0.012 Liters. It is believed that moving the machine may have changed the (true) mean fill volume, but it is unlikely to have changed the (true) standard deviation. Assume that both samples come from approximately normal populations. Derive a 95% confidence interval for the difference between the (true) mean fill volumes at the two locations.

Q8. A sample of 120 pieces of yarn had mean breaking strength 6.2 N and standard deviation 0.6 N. A new batch of yarn was made, using new raw materials from a different vendor. In a sample of 70 pieces of yarn from the new batch, the mean breaking strength 5.7 N and standard deviation was 1.2 N. Find a 95% confidence interval of the difference in mean breaking strength between the two types of yarn.