2019 Spring – SPC&O HW#7

1. Using the body temperature data you collected and the idea of "rational subgrouping", propose and construct $\overline{X}$-R control chart(s) to monitor your body health status. State clearly the "rationale" behind the constructed control charts.

2. Use the CD data provided in 19Spring-HW4.xls to:
   (i) Construct the $\overline{X}$-R Shewhart control chart for monitoring special causes that may result in the CD excursion of the wafer's peripheral sites, i.e., sites 1, 2, 4, and 5.
   (ii) Apply the runs rules to the control charts constructed in (i).
   (iii) Estimate σ_x by S_x and construct an individual X chart based on S_x for the center site, i.e., site 3.
   (iv) Estimate σ_x by S_p (the pooled moving sample variance with moving sample size=2 and 5). Construct individual X control charts based on S_p for site 3 with moving sample size=2 and 5, respectively, and compare them to the control chart in (iii).
   (v) Construct MR charts with the moving sample size set to 2 and 5, respectively, for site 3.
   (vi) Assuming that μ_0=60 and μ_1=59, use the sequential likelihood ratio test to test each wafer's site 3 with α=0.003 and β=0.3.
   (vii) Let μ_0=59.5. Construct a "graphical" Tabular CUSUM charts (like slide 38 of SPCO3.pdf) for site 3 with the (K, H)=(0.5σ, 5σ) and (0.25σ, 8σ), where σ is the estimated CD standard deviation of site 3. Estimate the new CD mean when the process is signaled out-of-control by the control chart.