

2024Spring – SPC&O HW#8

1. Suppose the mean thickness of one wafer has been shifted from 350 to 353. What is the Type II error probability (β) for the control charts constructed in 1(g) of HW#7? What are the ARL_1 ?
2. In the “Wafer defect” sheet of 24Spring-HW8.xls, we collect number of defects per wafer from 100 lots of wafers. Each lot contains different numbers of wafers (up to 25).
 - (a) Use the first 50 lots to construct a u chart to monitor the last 50 lots.
 - (b) What are the Type I error probability and ARL_0 for the chart in (a)? What are the Type II error probability and ARL_1 if the number of defects is actually increased to 22 per wafer?
 - (c) A wafer is said to be defective if the number of defects per wafer is greater than 20. Use the first 50 lots to construct a p chart to monitor the last 50 lots. What is the Type I error probability for this chart? What is the Type II error probability if the fraction defective is increased to 0.2?
3. Use the thickness data (24Spring-HW#4.xls) to
 - (a) Construct $\bar{X} - R$ control charts using the thickness data of the first 45 center-zone wafers to monitor the last 40 wafers by applying the eight runs rules to detect the special causes that will lead to abnormal thickness at **the outer ring of the center-zone**.
 - (b) Construct $\bar{X} - R$ control charts using the thickness data of the first 60 wafers to monitor the last 25 wafers by applying the eight runs rules to detect special causes that will lead to abnormal thickness at the **left position of entire lot** (including all three zones).