20312 Operations Management

Homework No. 2

Individual homework

Textbook 6.4, and 6.7

6.4 (a)

\[
\bar{X} = 116.42 \\
\bar{R} = (132 + 85 + 100 + 100)/4 = 104.25
\]

Control limits for mean:

\[
UCL = \bar{X} + A_2 \bar{R} = 116.42 + (.483)(104.25) = 166.77 \\
LCL = \bar{X} - A_2 \bar{R} = 116.42 - (.483)(104.25) = 66.07
\]

Control limits for range:

\[
UCL = D_4 \bar{R} = (2.004)(104.25) = 208.92 \\
LCL = D_3 \bar{R} = (0)(104.25) = 0
\]

(b)

Sample mean: \( \bar{X} = (180 + 125 + 110 + 98 + 156 + 190)/6 = 143.17 \)

Sample range: \( R = 190 - 98 = 92 \)

Both within the ranges.

6.7 (a)

\[
\bar{P} = \frac{76}{2000} = .038
\]

\[
\sigma_p = \sqrt{\frac{.038(1-.038)}{100}} = .0191
\]

\[
UCL = .036 + (3)(.0191) = .095 \\
LCL = .036 - (3)(.0191) = 0
\]

(b) The expected number of wrong test results = \( n\bar{P} = 100(.038) = 3.8 \).

(c) \( p = .10 \) is above the \( UCL \), therefore the system is out of control.