

Ex1

$$n = 100 ; m = 20 ; \sum_{i=1}^{20} D_i = 117 ; \bar{p} = ; \frac{\sum_{i=1}^{20} D_i}{mn} = 0.0585$$

$$UCL_p = \bar{p} + 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}} = 0.1289$$

$$CL_p = \bar{p} = 0.0585$$

$$LCL_p = \bar{p} - 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}} < 0 \text{ then } LCL_p = 0$$

One point more than 3 standard deviations from center line.

Test failed at point 12

Sample 12 is out of control, so remove it from control limit calculation:

$$n = 100 ; m = 19 ; \sum_{i=1}^{19} D_i = 102 ; \bar{p} = ; \frac{\sum_{i=1}^{19} D_i}{mn} = 0.0537$$

$$UCL_p = \bar{p} + 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}} = 0.1213$$

$$CL_p = \bar{p} = 0.0537$$

$$LCL_p = \bar{p} - 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}} < 0 \text{ then } LCL_p = 0$$

The process is in control.

Ex2

$$n = 150 ; m = 20 ; \sum_{i=1}^{20} D_i = 69 ; \bar{p} = ; \frac{\sum_{i=1}^{20} D_i}{mn} = 0.0230$$

$$UCL_p = \bar{p} + 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}} = 0.0597$$

$$CL_p = \bar{p} = 0.0230$$

$$LCL_p = \bar{p} - 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}} < 0 \text{ then } LCL_p = 0$$

Two points more than 3 standard deviations from center line.

Test failed at point 9,17

Samples 9 and 17 are out of control, so remove them from control limit calculation:

$$n = 150 ; m = 18 ; \sum_{i=1}^{20} D_i = 44 ; \bar{p} = ; \frac{\sum_{i=1}^{20} D_i}{mn} = 0.0163$$

$$UCL_p = \bar{p} + 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}} = 0.0473$$

$$CL_p = \bar{p} = 0.0163$$

$$LCL_p = \bar{p} - 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}} < 0 \text{ then } LCL_p = 0$$

One point more than 3 standard deviations from center line.

Test failed at point 1

Sample 1 is out of control, so remove it from control limit calculation:

$$n = 150 ; m = 17 ; \sum_{i=1}^{20} D_i = 36 ; \bar{p} = ; \frac{\sum_{i=1}^{20} D_i}{mn} = 0.0141$$

$$UCL_p = \bar{p} + 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}} = 0.043$$

$$CL_p = \bar{p} = 0.0141$$

$$LCL_p = \bar{p} - 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}} < 0 \text{ then } LCL_p = 0$$

Ex3

$$\sum n_i = 1000 \quad ; m = 10 \quad ; \bar{n} = \frac{\sum_{i=1}^{10} n_i}{m} = 100$$

$$\bar{p} = \frac{\sum_{i=1}^{10} D_i}{\sum_{i=1}^{10} n_i} = 0.06$$

$$UCL_p = \bar{p} + 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{\bar{n}}} = 0.1312$$

$$CL_p = \bar{p} = 0.06$$

$$LCL_p = \bar{p} - 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{\bar{n}}} < 0 \quad \text{then } LCL_p = 0$$

The process appears to be in statistical control.

Ex4

$$CL = \bar{c} = 2.36$$

$$UCL = \bar{c} + 3\sqrt{\bar{c}} = 6.97$$

$$LCL = \bar{c} - 3\sqrt{\bar{c}} < 0 \quad \text{then } LCL = 0$$

One point more than 3 standard deviations from center line.

Test failed at point 13

Sample 13 is out of control, so remove it from control limit calculation:

$$CL = \bar{c} = 2.125$$

$$UCL = \bar{c} + 3\sqrt{\bar{c}} = 6.5$$

$$LCL = \bar{c} - 3\sqrt{\bar{c}} < 0 \quad \text{then } LCL = 0$$

The process appears to be in statistical control.