In this solution prepared by the authors, the target of 1% is used as ‘center line’, instead of the average proportion calculated from the 10 samples. In effect, the authors suggest that the target (or theoretical) value, if one exists, ought to be used in specifying the center line and control limits in the control chart. [Please note that I provided the conclusion shown below the p chart.]

a. Compute the center line and $2\sigma$ control limits for the $p$ chart.

$$\bar{p} = \text{Center line} = 1.0 \%$$

$$\text{Limits} = \bar{p} \pm 2 \sqrt{[\bar{p}(100 - \bar{p})]/n}$$

$$= 1.0 \pm 2 \sqrt{[1.0(100 - 1.0)]/300}$$

$$= 1.0 \pm 1.149 = 0 \text{ and } 2.149 \text{ percent}$$

b. Plot the data from the 10 samples and decide if the flow soldering operation is in control.
One plot (sample 9) is above the upper control limit. [One may argue, as well, that this \( p \) chart shows erratic behavior of sample proportions.] This constitutes evidence that the process is out of control—using the criteria of Keller & Warrack or Chase et al. The process should be investigated to find and correct assignable cause(s) of poor performance.