Module 5 – HW Questions

Please submit your answers to these homework questions via the Coursera website.

20-Station Assembly Line

Consider an assembly line with 20 stations. Each station has a 0.5% probability of making a defect. At the end of the line, an inspection step singles out the defective units. The inspection step catches 80% of all defects. From inspection, units that are deemed to be non-defective are moved to the shipping department.

If a defect is found at inspection, it is sent to the rework department. Rework fixes about 95% of the defective units. Units are directly shipped from the rework department with no further inspection taking place.

20SAL1. What is the likelihood that a unit ends up in rework?

20SAL2. What is the likelihood that a defective unit is shipped?

3-Step Process with Rework

Consider the following three-step assembly operation with quality problems. All resources are staffed by one employee.

- The first resource has a processing time of 7 minutes per unit.
- The second resource has a processing time of 6 minutes per unit.
- The third resource has a processing time of 5 minutes per unit. With a 40% probability, the flow unit coming out of the third resource has to be reworked. In that case, the operations at the second and third resources are repeated. You can assume that (a) rework always succeeds (i.e. a unit going through the rework loop will always work after the third resource) and (b) the processing times for units in rework are the same as for regular units.

3SPR1. For every unit of demand, how many units have to flow through the second step in the process?

3SPR2. Where in the process is the bottleneck?

Flu Shot Dosage

A hospital in a developing nation is forced to manually put the flu shot vaccine into syringes. The recommended dosage for the flu shot is 0.5mL. The local health authorities define all syringes that have less than 0.45ml or more than 0.55mL as defective.

In a sample of 100 syringes, the hospital's quality control officer finds the average dosage to be 0.5mL. The standard deviation of the dosage is 0.02 mL and the distribution of the dosages resembles a normal distribution reasonably closely.

FD1. What is the capability score of the manual filling process?

FD2. What percentage of the manually filled syringes will be outside the specification limits provided by the local health authorities?

FD3. To what level would the hospital have to reduce the standard deviation of the operation if his goal were to obtain a capability score of Cp=4/3 (i.e., get 63 defects per million)?

Kanban Cards

KC1. Which of the following statements about the Kanban System are accurate?

I. Deploying the Kanban system leads to pulling work through the system instead of pushing work.
II. Deploying the Kanban system leads to pushing work through the system instead of pulling work.
III. The Kanban system controls the work in process inventory.
IV. Kanban requires cross-training all workers.

a. I only
b. II only
c. III and IV only
d. I and III only
e. I, II and IV
f. I and IV only