Final Exam – Module 3 Questions

Please submit your answers via the Module 3 web form on the Coursera site.

PTests

Precision Testing (PTests) does fluid testing for several local hospitals. Consider their urine testing process. Each sample requires 12 seconds to test, but after 300 samples, the equipment must be recalibrated. No samples can be tested during the recalibration process, and that process takes 30 minutes.

PT1. What is PTest's maximum capacity to test urine samples (in samples per hour)?

PT2. Suppose 2.5 urine samples need to be tested per minute. What is the smallest batch size (in samples) that ensures that the process is not supply constrained? (Note: A batch is the number of tests between calibrations.)

Power For All (PFA)

Power For All (PFA) makes two types of protein products – soy-based protein and whey-based protein. Demand for soy-based protein is 10 kilograms per hour, and demand for whey-based protein is 2 kgs per hour. PFA can make protein powder of either type at 3 minutes per kg. However, when switching from one type to the other, the production has to be halted for 30 minutes. During those switchover times, the process doesn't produce any protein. The owner of PFA wants to choose a production schedule that (i) cycles repeatedly through the two models, (ii) meets the required demand, and (iii) minimizes the amount of inventory held.

PFA1. How much soy-based protein (in kgs) should PFA produce before switching over to whey-based protein?

PFA2. Now, suppose that PFA offers a new product, a slow-diffusing mix of both soy- and whey-based protein. Demand for the new product will not change the demand of the existing two protein types, and there will be 3 kg per hour demanded for the new protein product. The set-up time for the new product is also 30 minutes. How much soy protein (in kgs) is now produced before switching over to whey-based protein?