

## Problem Set 7

### Problem 7-1. Systems

- (a) Explain what happens to inventory as cycle time decreases.
- (b) Describe your process of doing laundry. How many operations, what are the respective production rates, do you have any buffers, what is the cycle time?

### Problem 7-2. Boston Weather

- (a) The average daily temperature for Boston in May is  $58.5^{\circ}F$ . Suppose the standard deviation is  $8.157^{\circ}F$  and assume the temperature obeys a normal distribution. How many days in May are less than  $43^{\circ}F$ ? (This is a bad analogy since we are making assumptions that are totally bogus. Just be sure that you can do simple calculations with normal distributions for the exam.)
- (b) As a condition of coming to MIT for graduate school, I sent MIT my specifications for the temperature range during the month of May (MIT controls everything, dont they?) In particular, I agreed to a daily temperature of  $62^{\circ}F$  but would tolerate plus or minus 5 degree shifts. Based on the data from (a), what is MIT's capability index ( $Cpk$ )?

### Problem 7-3. Shaft

- (a) Your enterprise is using a process which produces parts whose length have a mean 2.5in and standard deviation 0.015in. You plan to make 100,000 of these parts. You have determined by taking into account the rework cost and the loss of customer satisfaction that the quality loss function for the process is:

$$L = 2250\sigma^2$$

where  $\sigma$  is the standard deviation of length of the part and  $L$  is the average quality lost in dollars per part.

A very smart but somewhat expensive Harvard graduate has offered you her expert advice on your process. For every 0.001in reduction in the standard deviation of the length of the part, she will charge 6000.

How much of her advice do you buy? (You can buy fractional amounts of her consulting).