1. [10 points] Consider the following value stream map:



The typical work day is 8 hours per employee and they generally work 5 days per week. They

release updates to their software every 2 business weeks.

1. What is the total lead time in hours?

1 + 5 + 10 + 5 + 5 = 26

**Total Lead Time =** 26 days

1. What is the total process time in hours?

1 + 2 + 8\* + 1 + 3 = 15 hours

\*Assumed that 1 day = to 8 hours

**Total Process Time =** 15 hours

1. What is the process cycle efficiency?

26 days \* 24 hours = 624 hours

15 hours / 624 hours = 0.0240

0.0240 \* 100 = 2.4 %

**Process Cycle Efficiency =** 2.4%

1. What is the %C&A for the process?

.90 x .75 x .80 x .95 x .95 = 0.48735

.48735 x 100 = 49%

**%C&A =** 49%

e. If the development team typically completes 100 story points per 2-week iteration, what

is the average task time of each story point per hour?

2 weeks \* 24 hours \* 5 days = 240 hours

240 hours / 100 points = 2.4 points per hour

60 minutes / 2.4 points = 25 minutes per point

**Task Time per Story Point =** 25 minutes

2. [15 points] Using the provided Excel spreadsheet, perform the same simulation that we did in

class.

a. Run the simulation using the spreadsheet by filling in the values in the ’roll’ row. You

can use a 6-sided die or some other random number generator that gives you reasonably

random numbers between 1 and 6. Save a copy of the worksheet as a PDF.

**(Saved as Homework 2 Exercise A PDF)**

b. Experiment by changing the %C&A values for the various workstations. What is the

impact on workstation ’E’ of changing the %C&A values of the earlier workstations?

Since the workstation ‘E’ depends on all other station’s finishing their job “completely and accurately” it is extremely difficult or impossible for them to be able to make up for both the deviation and the time wasted due to defects in previous workstations. In other words, a lower %C&A in any of the previous workstations greatly constraints the output of the entire operation. This experiment supports the “Theory of Constraints” by demonstrating that even if workstation ‘E’ or any other of the later workstations make changes, work flawlessly and achieve a %C&A of 100%, their optimization efforts are almost irrelevant if the real constraint on the earlier workstations is not addressed.

c. Plug in the %C&A values from problem 1 of this assignment into your simulation and

save a copy of the worksheet as a PDF. How do the deviations from the 3.5 mean differ

from that of the baseline you established in part a of this question?

The deviations differ greatly due to the extra time wasted on reworks when the %C&A is not 100%. The final deviation went from -4.5 when the %C&A was 100% to -12.5 when the %C&A from problem 1 was used. This demonstrates the compounding effect that constraints have on the system’s output. Not only is there a natural deviation of output that needs to be kept in mind, but this deviation is further exacerbated when the %C&A is below 100% in multiple workstations, both of these factors need to be considered when creating deadlines in order to ensure that the work will be accomplished on time.