CSE 4549 – Simulation & Modeling 2020-21

Quiz 1

a) State variables : server state $x(t)$, queue length $q(t)$

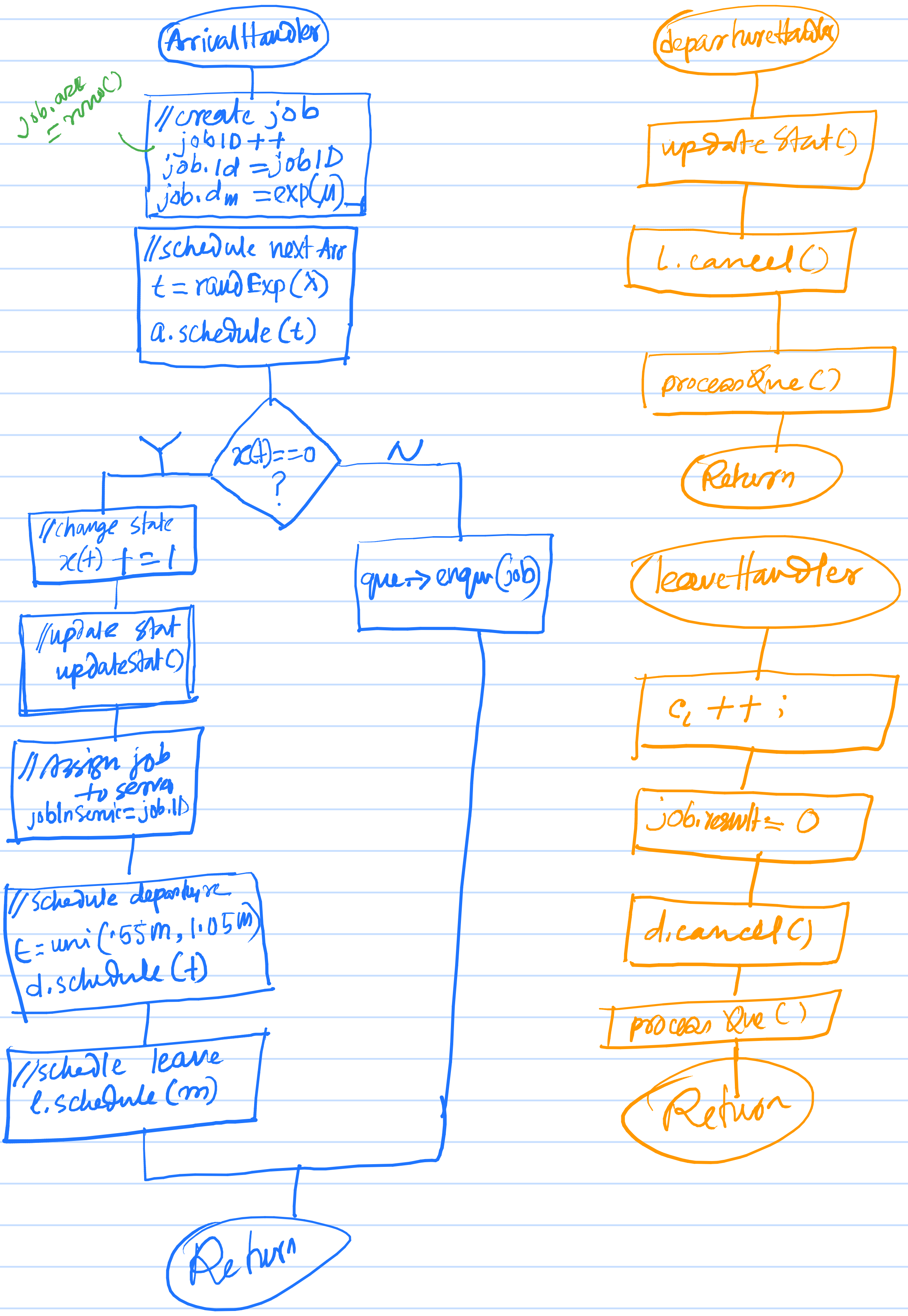
Output variables : $d_i \rightarrow$ delay of ith job
$d_m \rightarrow$ max delay
$\bar{d} \rightarrow$ average delay
$c_5 \rightarrow$ # of jobs with more than 5 min dela
$c_e \rightarrow$ # of job left
$c_t \rightarrow$ # of total job.

b) events : arrival, departure, leave, termination

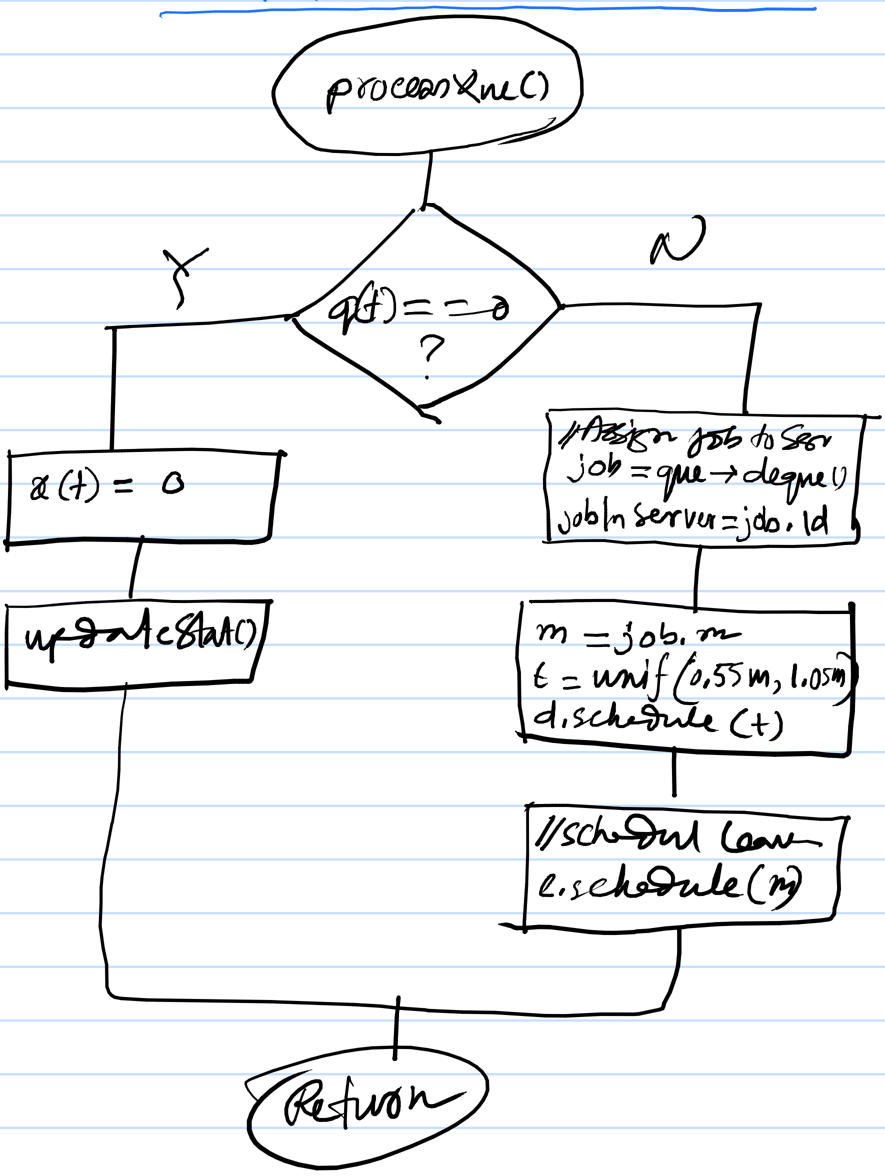
c)
$$x(t) = \begin{cases} x(t)+1, & \text{if arrival occurs and } x(t)==0 \\ x(t)-1, & \text{if departure occurs and } q(t)==0 \\ x(t), & \text{otherwise} \end{cases}$$

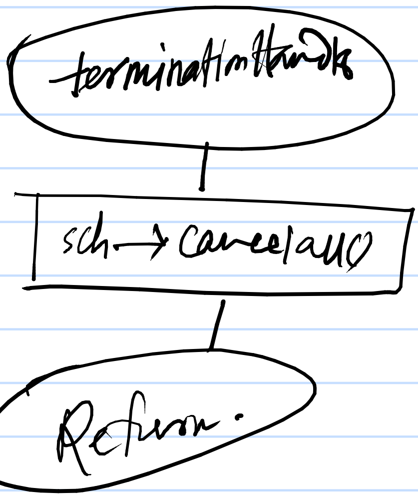
$$q(t) = \begin{cases} q(t)+1, & \text{if arrival occurs and } x(t)==1 \\ q(t)-1, & \text{if departure occurs and } q(t)>0 \end{cases}$$

d) $S = \{ (0,0), (1,0), (1,1), (1,2), (1,3), \ldots \}$



CSE 4549, 2020-21, quiz 1





b) Output equation

$$\bar{d} = \sum_{i=1}^{c_t} d_i \Rightarrow \text{avg delay}$$

$$d_m = \max_{i} (d_i) \Rightarrow \text{max delay}$$

$$c_5 = \sum_{i=1}^{c_t} I(d_i) \; ; \quad I(d_i) = \begin{cases} 1, & \text{if } d_i > 5 \\ 0, & \text{o/w} \end{cases}$$

$$p = \frac{c_5}{c_t} \Rightarrow \text{Proportion of job with more than 5 min delay.}$$