1.

Time	Current Event	S	R	q	Event List
20.1	Renege (15)	0	5	{14,17}	20.7 End Service 22.6 Renege (14) 23.2 Arrival (20) 24.6 Renege (17) 25.1 End Service
20.7	End Service	1	5	{14,17}	20.7 Start Service 22.6 Renege (14) 23.2 Arrival (20) 24.6 Renege (17) 25.1 End Service
20.7	Start Service	0	5	{17}	23.2 Arrival (20) 24.3 End Service 24.6 Renege (17) 25.1 End Service
23.2	Arrival (20)	0	5	{17, 20}	24.3 End Service 24.6 Renege (17) 25.1 End Service 25.9 Arrival (21) 26.4 Renege(20)

2. <u>Parameters</u>:

$\{t_{A_i}\}$ =interarrival times of customers of type i (i=0,1)

$\{t_{S_u}\}$ = Service times for customers of type i (i=0,1)

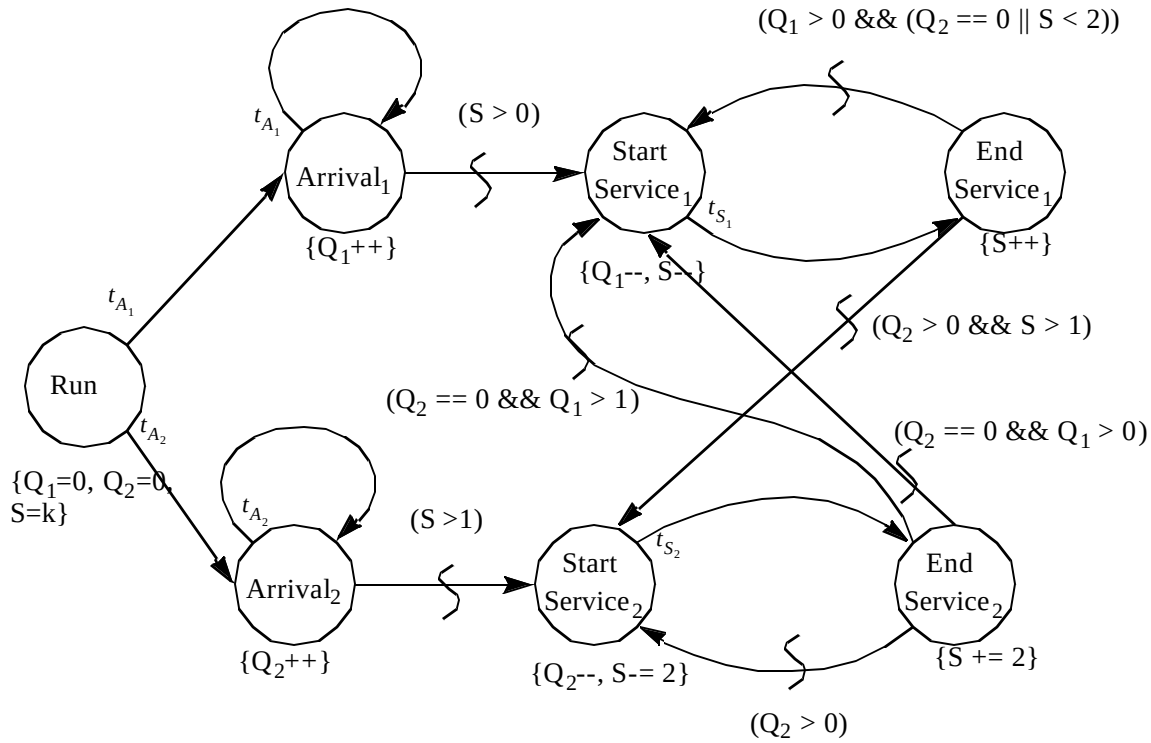
k = # servers

<u>State:</u>

Q_i = # in queue i (i=0,1)

S = # available servers (initially k)

<u>Event Graph:</u>



3.

```
private RandomVariate interarrivalTime;
private RandomVariate failureTime;
private RandomVariate repairTime;

public void doArrival() {
      firePropertyChange("numberInQueue", numberInQueue, ++numberInQueue);
      waitDelay("Arrival", interarrivalTime.generate());
      if (numberAvailableServers > 0) {
            waitDelay("StartService", 0.0);
      }
}

public void doFailure() {
      firePropertyChange("machineFailed", machineFailed, ++machineFailed);
      int oldNumberInQueue = numberInQueue;
      numberInQueue += 1 - numberAvailableServers;
      firePropertyChange("numberInQueue", oldNumberInQueue, numberInQueue);
      int oldNumberAvailableServers = numberAvailableServers;
      firePropertyChange("numberAvailableServers", oldNumberAvailableServers,
            numberAvailableServers);
      interrupt("EndService");
      waitDelay("EndRepair", repairTime.generate());
}

public void doEndRepair() {
      firePropertyChange("machineFailed", machineFailed, --machineFailed);
      firePropertyChange("numberAvailableServers", 0, 1);
      if (numberInQueue > 0) {
            waitDelay("StartService", 0.0);
      }
      waitDelay("Failure", failureTime.generate());
}
```

4.

a. The velocity is v = (80, 40)/ $\sqrt{5}$ = (35.777, 17.889)

The formula gives the time to enter range as t_E = 1.230. Since the current time is 3.0, the time range is entered is 4.230.

b. The location at enter range is (-10, 20) + 1.230(35.777, 17.889) = (34, 42).