Write a program to simulate the following scenerioes, using C/C++/Java/python/R/Matlab

Call Center

- Interarrival distribution of calls for technical support

Time between Arrivals [Minute]	Probability	Cumulative Probability	Random-Digit Assignment
1	0.25	0.25	01 – 25
2	0.40	0.65	26 – 65
3	0.20	0.85	66 – 85
4	0.15	1.00	86 – 00

Goto: Random-Digits

Service time distribution of Able

Service Time [Minute]	Probability	Cumulative Probability	Random-Digit Assignment
2	0.30	0.30	01 – 30
3	0.28	0.58	31 – 58
4	0.25	0.83	59 – 83
5	0.17	1.00	84 – 00

Service time distribution of Baker

Service Time [Minute]	Probability	Cumulative Probability	Random-Digit Assignment
3	0.35	0.35	01 – 35
4	0.25	0.60	36 – 60
5	0.20	0.80	61 – 80
6	0.20	1.00	81 – 00

Call center

Simulation proceeds as follows

- Step 1:
  - For Caller k, generate an interarrival time A_k. Add it to the previous arrival time T_{k-1} to get arrival time of Caller k as $T_k = T_{k-1} + A_k$
- Step 2:
  - If Able is idle, Caller k begins service with Able at the current time T_{now}
  - Able's service completion time $T_{fin,A}$ is given by $T_{fin,A} = T_{now} + T_{svc,A}$ where $T_{svc,A}$ is the service time generated from Able's service time distribution. Caller k's waiting time is $T_{wait} = 0$.
  - Caller k's time in system, T_{sys}, is given by $T_{sys} = T_{fin,A} - T_k$
  - If Able is busy and Baker is idle, Caller begins with Baker. The remainder is in analogous.
- Step 3:
  - If Able and Baker are both busy, then calculate the time at which the first one becomes available, as follows: $T_{beg} = \min(T_{fin,A}, T_{fin,B})$
  - Caller k begins service at T_{beg}. When service for Caller k begins, set $T_{now} = T_{beg}$.
  - Compute $T_{fin,A}$ or $T_{fin,B}$ as in Step 2.
  - Caller k's time in system is $T_{sys} = T_{fin,A} - T_k$ or $T_{sys} = T_{fin,B} - T_k$

Call Center

- Simulation run for 100 calls

Caller Nr.	Interarrival Time	Arrival Time	When Able Avail.	When Baker Avail.	Server Chosen	Service Time	Time Service Begins	Able's Service Compl. Time	Baker's Service Compl. Time	Caller Delay	Time in System
1	-	0	0	0	Able	2	0	2		0	2
2	2	2	2	0	Able	2	2	4		0	2
3	4	6	4	0	Able	2	6	8		0	2
4	2	8	8	0	Able	4	8	12		0	4
5	1	9	12	0	Baker	3	9		12	0	3
...	...	...	...	...							
100	1	219	221	219	Baker	4	219			0	4
Total										211	564

Exercise

1-9. Suppose you are the manufacturer of a car which is in great demand. At present you make 1,000 cars per month and sell it easily at Rs. 20,000 each (ignore excise duty, sales tax, etc., for the time being). By using overtime, etc., you can increase the production, but you must also increase the price in order to make a profit (10 per cent on sale). The number of cars you can produce and the corresponding price (of all units) is given below:

Cars	Production	1,000	1,200	1,300	1,500	2,000
	Price	20,000	21,000	22,000	25,000	30,000

The demand for your cars is predicted to rise at 5 per cent per year provided the price stays at Rs. 20,000 each. As the price rises a certain number of customers will switch to other cars (or scooters). This switchover percentage is estimated to be as below:

Price	20,000	21,000	22,000	25,000	30,000
Percentage switched	0	5	10	25	50

By investing capital you can increase your production without increasing the cost per unit. But you must pay 8 per cent interest on the additional capital. The investments and the corresponding increases in production are as follows:

Investment in Rs.	1,000,000	2,000,000	5,000,000
Increase in production of cars	300	500	1,000

Simulate the company's situation over the next 20 years. By experimenting with the model find out which investment should be made and when (if any).