Mean Value Analysis

Let us consider a mixed multiclass model characterized by three stations, one open class and two closed classes, with the arrival rates, think times, visits, average service times and number of jobs as specified in the included table.

Determine for each station:

- *Utilization*
- *Throughput*
- *Average number of jobs in the station*
- *Average queue size (excluding the job in service)*
- *Average Response Time*
- *Average Residence Time*
- *Average Time spent in queue (during one visit)*

Compute for the entire system:

- *System Throughput*
- *Average number of jobs not thinking*
- *Average System response time*

Use exact MVA to consider the closed classes.

Chose the appropriate set of model parameters according to the last two digits on the right (the least significant) of your “Codice Persona”. **This exercise is mandatory and must be presented at the exam!**

					Think Time		Arrival rate	Visits									Average Service Time [sec.]									Population	
Which					[sec.]		[job/sec.]	station 1			station 2			station 3			station 1			station 2			station 3				
Last digitis of "Codice Persona"					Z_B	Z_C	lambda_A	v1A	v1B	v1C	v2A	v2B	v2C	v3A	v3B	v3C	S1A	S1B	S1C	S2A	S2B	S2C	S3A	S3B	S3C	N_B	N_C
00	20	40	60	80	5	1	2	4	0.2	1	1	2	0.25	12	10	10	0.119	30	1	0.1	20	2	0.033	30	2	20	10
01	21	41	61	81	5	1	10	3	0.2	1.25	1	1	2	3	15	10	0.03	30	2	0.05	30	1	0.032	10	2	10	20
02	22	42	62	82	20	1	1	3	1	0.1	1	1	0.25	15	12	10	0.3	10	2	0.5	10	1	0.053	30	1	15	15
03	23	43	63	83	10	20	3	0.5	0.2	1.25	0.1	1	0.25	15	3	2	0.633	30	2	0.667	30	2	0.021	30	1	15	10
04	24	44	64	84	5	5	1	2	1.25	0.4	1	1.5	1	3	12	1	0.475	30	3	0.5	10	3	0.267	20	2	15	20
05	25	45	65	85	5	10	1	4	0.1	0.2	1.5	0.4	1.5	15	12	2	0.238	10	3	0.2	30	1	0.053	20	2	10	15
06	26	46	66	86	10	1	0.5	4	0.1	1.5	1.5	0.4	0.25	3	15	10	0.4	30	2	0.667	20	2	0.633	30	2	10	20
07	27	47	67	87	5	1	4	10	0.1	1.25	1.25	2	1	15	15	10	0.024	10	3	0.06	20	2	0.013	30	3	20	15
08	28	48	68	88	10	1	1	3	0.2	1	1.5	1.5	2	3	10	1	0.267	10	1	0.2	20	1	0.267	20	1	10	10
09	29	49	69	89	20	1	1	1	0.4	1.25	0.1	2	0.4	6	6	5	0.9	30	3	5	20	3	0.133	20	1	15	10
10	30	50	70	90	10	10	10	1	0.4	0.4	1.5	1	0.4	15	12	10	0.095	20	2	0.033	10	3	0.006	20	2	15	20
11	31	51	71	91	1	5	1	10	1.5	1.5	0.2	0.25	0.25	6	3	5	0.09	30	1	1	20	3	0.158	10	3	15	10
12	32	52	72	92	20	5	3	4	0.4	1	0.4	0.4	0.25	6	15	5	0.067	10	1	0.167	10	3	0.053	20	3	20	10
13	33	53	73	93	10	10	4	1	1.5	0.4	0.4	1	1	15	10	1	0.225	30	1	0.125	10	3	0.015	30	1	20	20
14	34	54	74	94	20	1	3	10	0.1	1.25	0.1	1	0.25	15	6	2	0.03	10	3	1	10	2	0.018	20	3	20	15
15	35	55	75	95	10	10	10	0.5	1	0.4	1	1	0.4	3	6	5	0.16	30	3	0.03	10	1	0.03	30	1	15	10
16	36	56	76	96	5	10	1	4	0.1	0.2	0.4	1.5	0.2	6	15	5	0.238	10	2	0.75	10	2	0.15	10	1	15	20
17	37	57	77	97	1	1	10	0.5	1	1.5	1.5	0.4	2	12	3	1	0.19	10	1	0.033	30	1	0.007	10	2	10	20
18	38	58	78	98	5	20	10	10	1	0.1	1.5	0.2	2	12	10	2	0.01	20	1	0.033	20	2	0.008	30	1	10	10
19	39	59	79	99	5	5	1	1	0.4	0.2	0.4	1	0.2	3	10	2	0.8	20	3	0.75	10	3	0.317	20	1	15	10
Friday class					10	5	3	3	0.4	1.5	0.1	0.2	0.25	3	15	1	0.089	20	3	0.1	20	2	0.1	30	1	20	10
Monday					1	20	10	2	1.25	1	1.25	0.25	0.25	3	15	10	0.04	20	1	0.04	20	3	0.032	30	3	15	10