## http://downloadlink.org/product/solutions-manual-for-simulation-with-arena-6th-edition-by-kelton/

Exercise 2-1 Solution file from Kelton/Sadowski/Zupick, Simulation With Arena, 6th edition, McGraw-Hill, 2015

Define S(t) = the total number of parts in the system (in queue plus in service) at time t, let  $\hat{S}$  denote the area under S(t) up to the event time at a row in the table, and  $S^*$  be the maximum

value of S(t) observed up to the event time in the row. Table 2-2 is then augmented as follows (the new cells are shaded):

	Just-Finished Event		Variables			Attributes			Statistical Accumulators										Event Calendar		
Entity	Entity Time Event					Arrival Times:															
No.	t	Type	Q(t)	B(t)	S(t)	(In Queue)	In Service	P	N	$\Sigma WQ$	$WQ^*$	$\Sigma TS$	TS*	ſQ	$Q^*$	∫B	ſS	$S^*$	[Entity No.,	Time,	Type]
																			[1,	0.00,	Arr]
_	0.00	Init	0	0	0	0	_	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	[–,	20.00,	End]
																			[2,	1.73,	Arr]
1	0.00	Arr	0	1	1	0	0.00	0	1	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	1	[1, [-,	2.90, 20.00,	Dep] End]
																			[1,	2.90,	Dep]
2	1.73	Arr	1	1	2	(1.73)	0.00	0	1	0.00	0.00	0.00	0.00	0.00	1	1.73	1.73	2	[3,	3.08,	Arr]
																			[-,	20.00,	End]
	2.90	Dep	0	1	1	0	<u>1.73</u>	1				2.90	2.90	1.17	1	2.90	4.07	2	[3,	3.08,	Arr]
1									2	1.17	1.17								[2,	4.66,	Dep]
																			[-,	20.00,	End]
																			[4,	3.79,	Arr]
3	3.08	Arr	1	1	2	(3.08)	1.73	1	2	1.17	1.17	2.90	2.90	1.17	1	3.08	4.25	2	[2,	4.66,	Dep]
																			[-,	20.00,	End]
	2.50					(2.50, 2.00)	4.50		_			• • • •	• • • •	4.00		2.50			[5,	4.41,	Arr]
4	3.79	Arr	2	1	3	(3.79, 3.08)	<u>1.73</u>	1	2	1.17	1.17	2.90	2.90	1.88	2	3.79	5.67	3	[2,	4.66,	Dep]
																			[-,	20.00,	End]
5	4.41	Arr	3	1	4	(4.41, 3.79, 3.08)	1.72	1	2	1.17	1.17	2.90	2.90	3.12	2	4.41	7.53	4	[2,	4.66, 18.69,	Dep]
3	4.41	AII	3	1	4	(4.41, 5.79, 5.08)	<u>1.73</u>	1	2	1.17	1.17	2.90	2.90	3.12	3	4.41	1.33	4	[6,	20.00,	Arr] End]
																			[-,	8.05,	Dep]
2	4.66	Dep	2	1	3	(4.41, 3.79)	3.08	2	3	2.75	1.58	5.83	2.93	3.87	3	4.66	8.53	4	[6,	18.69,	Arr]
		БСР	_	•	J	(1, 5.77)	<u>5.00</u>	_		2.70	1.00	2.02	2.,0	0.07	J		0.00	·	[-,	20.00,	End]
																			[4,	12.57,	Dep]
3	8.05	Dep	1	1	2	(4.41)	3.79	3	4	7.01	4.26	10.80	4.97	10.65	3	8.05	18.79	4	[6,	18.69,	Arr]
		1																	[-,	20.00,	End]
																			[5,	17.03,	Dep]
4	12.57	Dep	0	1	1	0	4.41	4	5	15.17	8.16	19.58	8.78	15.17	3	12.57	27.74	4	[6,	18.69,	Arr]
																			[-,	20.00,	End]
																			[6,	18.69,	Arr]
5	17.03	Dep	0	0	0	O	-	5	5	15.17	8.16	32.20	12.62	15.17	3	17.03	32.20	4	[–,	20.00,	End]
																			[7,	19.39,	Arr]
6	18.69	Arr	0	1	1	()	18.69	5	6	15.17	8.16	32.20	12.62	15.17	3	17.03	32.20	4	[-,	20.00,	End]
																			[6,	23.05,	Dep]
																			[-,	20.00,	End]
7	19.39	Arr	1	1	2	(19.39)	18.69	5	6	15.17	8.16	32.20	12.62	15.17	3	17.73	32.90	4	[6,	23.05,	Dep]
																			[8,	34.91,	Arr]
																			[6,	23.05,	Dep]
_	20.00	End	1	1	2	(19.39)	<u>18.69</u>	5	6	15.17	8.16	32.20	12.62	15.78	3	18.34	34.12	4	[8,	34.91,	Arr]
			l																		

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The time-average number in system is 34.12/20 = 1.706 and the maximum number in system is 4. Here's a crude plot of S(t):

