

## 9. Anhang

### 9.1 Maßzahlen der Kundenzufriedenheit bei unterschiedlicher Nachfrage

Berechnete Maßzahlen der Kundenzufriedenheit bei einer Periodenlänge von 1800,  $\mu = 1/80$ ,  $\beta = 0,05$ ,  $\nu = 1/25$ ,  $K = c + 10$  und einem Service Level von 80/20.

Anzahl Anrufe	Leitungsanzahl	Agentenanzahl	bediente Kunden pro Agent	Service Level		Erreichbarkeit	Auslastung der Agenten	erwartete ankommen-der Kunden	Wartezeit bedienter Kunden	Wahrscheinlichkeit		
				bedienter Kunden	anrufender Kunden					des Blockierens	zurück-zusehen	aufzu-legen
10	12	2	4,78	99,27%	94,84%	95,54%	21,23%	1,03	0,41	0,00%	0,35%	4,12%
20	12	2	8,70	97,68%	84,98%	87,00%	38,67%	3,03	1,28	0,00%	0,99%	12,01%
30	13	3	9,25	98,51%	91,10%	92,48%	41,10%	1,73	0,86	0,00%	0,66%	6,87%
40	13	3	11,61	97,28%	84,69%	87,06%	51,59%	2,99	1,55	0,00%	1,11%	11,83%
50	14	4	11,49	98,29%	90,33%	91,91%	51,06%	1,84	1,04	0,00%	0,78%	7,32%
60	14	4	13,19	97,31%	85,54%	87,91%	58,61%	2,77	1,60	0,00%	1,14%	10,95%
70	14	4	14,64	96,15%	80,41%	83,63%	65,05%	3,77	2,26	0,00%	1,52%	14,85%
80	15	5	14,20	97,48%	86,55%	88,78%	63,13%	2,55	1,59	0,00%	1,14%	10,08%
90	15	5	15,37	96,55%	82,42%	85,37%	68,29%	3,34	2,13	0,00%	1,47%	13,17%
100	16	6	14,93	97,71%	87,51%	89,56%	66,34%	2,35	1,54	0,00%	1,14%	9,30%
110	16	6	15,90	96,94%	84,07%	86,72%	70,66%	3,01	2,01	0,00%	1,42%	11,86%
120	16	6	16,75	96,08%	80,48%	83,77%	74,46%	3,69	2,53	0,00%	1,71%	14,52%
130	17	7	16,31	97,30%	85,45%	87,82%	72,49%	2,74	1,90	0,00%	1,38%	10,80%
140	17	7	17,06	96,59%	82,37%	85,28%	75,80%	3,32	2,35	0,00%	1,64%	13,08%
150	18	8	16,64	97,63%	86,63%	88,73%	73,94%	2,51	1,79	0,00%	1,35%	9,92%
160	18	8	17,30	97,03%	83,93%	86,50%	76,89%	3,03	2,19	0,00%	1,59%	11,91%
170	18	8	17,89	96,37%	81,15%	84,21%	79,53%	3,56	2,62	0,00%	1,82%	13,97%
180	19	9	17,50	97,42%	85,26%	87,52%	77,80%	2,78	2,05	0,00%	1,54%	10,94%
190	19	9	18,04	96,86%	82,78%	85,47%	80,19%	3,25	2,44	0,00%	1,76%	12,77%
200	19	9	18,53	96,24%	80,24%	83,38%	82,35%	3,73	2,84	0,00%	1,98%	14,64%
210	20	10	18,17	97,27%	84,18%	86,54%	80,77%	2,99	2,28	0,00%	1,70%	11,76%
220	20	10	18,62	96,75%	81,89%	84,64%	82,76%	3,43	2,64	0,00%	1,91%	13,45%
230	21	11	18,28	97,63%	85,38%	87,45%	81,27%	2,77	2,14	0,00%	1,65%	10,90%
240	21	11	18,70	97,19%	83,31%	85,72%	83,12%	3,17	2,47	0,00%	1,85%	12,43%
250	21	11	19,08	96,70%	81,18%	83,96%	84,80%	3,57	2,82	0,00%	2,04%	14,00%
260	22	12	18,77	97,56%	84,54%	86,65%	83,44%	2,94	2,32	0,00%	1,79%	11,56%
270	22	12	19,13	97,14%	82,60%	85,03%	85,03%	3,31	2,64	0,00%	1,98%	12,99%
280	22	12	19,46	96,69%	80,62%	83,38%	86,47%	3,69	2,98	0,00%	2,16%	14,45%
290	23	13	19,18	97,52%	83,83%	85,97%	85,23%	3,09	2,48	0,00%	1,92%	12,11%
300	23	13	19,49	97,13%	82,01%	84,44%	86,60%	3,44	2,79	0,00%	2,10%	13,46%
310	23	13	19,77	96,70%	80,16%	82,89%	87,85%	3,79	3,12	0,01%	2,27%	14,83%
320	24	14	19,51	97,51%	83,24%	85,37%	86,72%	3,21	2,63	0,00%	2,04%	12,59%
330	24	14	19,78	97,14%	81,52%	83,92%	87,92%	3,54	2,93	0,01%	2,20%	13,87%
340	25	15	19,54	97,83%	84,33%	86,20%	86,83%	3,01	2,48	0,01%	1,98%	11,82%
350	25	15	19,80	97,52%	82,73%	84,84%	87,98%	3,32	2,76	0,01%	2,14%	13,01%
360	25	15	20,03	97,17%	81,11%	83,47%	89,04%	3,64	3,05	0,01%	2,30%	14,21%
370	26	16	19,81	97,84%	83,81%	85,66%	88,04%	3,13	2,60	0,01%	2,09%	12,24%
380	26	16	20,04	97,54%	82,30%	84,37%	89,06%	3,42	2,87	0,01%	2,24%	13,37%
390	26	16	20,25	97,22%	80,76%	83,07%	90,00%	3,72	3,16	0,02%	2,39%	14,52%
400	27	17	20,04	97,86%	83,36%	85,19%	89,08%	3,22	2,72	0,02%	2,18%	12,62%
410	27	17	20,25	97,58%	81,92%	83,95%	89,99%	3,51	2,98	0,02%	2,33%	13,69%
420	27	17	20,44	97,28%	80,46%	82,72%	90,83%	3,79	3,25	0,03%	2,48%	14,78%
430	28	18	20,25	97,89%	82,97%	84,75%	89,99%	3,31	2,83	0,02%	2,28%	12,95%
440	28	18	20,43	97,63%	81,59%	83,58%	90,80%	3,58	3,08	0,03%	2,42%	13,98%
450	28	18	20,60	97,35%	80,21%	82,40%	91,55%	3,85	3,34	0,04%	2,56%	15,01%
460	29	19	20,42	97,93%	82,62%	84,36%	90,78%	3,39	2,92	0,03%	2,36%	13,24%
470	29	19	20,59	97,68%	81,31%	83,24%	91,51%	3,65	3,17	0,04%	2,50%	14,23%
480	30	20	20,42	98,19%	83,55%	85,08%	90,76%	3,22	2,78	0,04%	2,31%	12,57%
490	30	20	20,58	97,98%	82,31%	84,01%	91,47%	3,46	3,01	0,05%	2,44%	13,51%
500	30	20	20,73	97,75%	81,06%	82,92%	92,14%	3,71	3,25	0,06%	2,57%	14,45%

Anzahl Anrufe	Leitungsanzahl	Agentenanzahl	bediente Kunden pro Agent	Service Level			Auslastung der Agenten	erwartete Wartezeit		Wahrscheinlichkeit		
				bedienter Kunden	anrufernder Kunden	Erreichbarkeit		ankommender Kunden	bedienter Kunden	des Blockierens	zurückzusehen	aufzulegen
510	31	21	20,57	98,23%	83,22%	84,72%	91,44%	3,29	2,87	0,05%	2,39%	12,85%
520	31	21	20,72	98,03%	82,03%	83,68%	92,09%	3,53	3,10	0,06%	2,51%	13,74%
530	31	21	20,86	97,82%	80,84%	82,64%	92,70%	3,76	3,33	0,08%	2,64%	14,64%
540	32	22	20,71	98,28%	82,93%	84,38%	92,05%	3,36	2,95	0,07%	2,46%	13,10%
550	32	22	20,84	98,09%	81,79%	83,38%	92,64%	3,58	3,17	0,08%	2,58%	13,96%
560	32	22	20,97	97,89%	80,64%	82,38%	93,19%	3,81	3,40	0,10%	2,71%	14,82%
570	33	23	20,83	98,33%	82,66%	84,06%	92,59%	3,42	3,03	0,09%	2,53%	13,32%
580	33	23	20,96	98,16%	81,57%	83,10%	93,14%	3,64	3,24	0,10%	2,65%	14,15%
590	33	23	21,07	97,97%	80,47%	82,13%	93,64%	3,85	3,46	0,12%	2,77%	14,97%
600	34	24	20,94	98,39%	82,42%	83,77%	93,08%	3,47	3,10	0,11%	2,60%	13,52%
610	34	24	21,06	98,23%	81,37%	82,84%	93,58%	3,68	3,31	0,13%	2,71%	14,31%
620	34	24	21,16	98,05%	80,32%	81,91%	94,04%	3,89	3,52	0,16%	2,82%	15,11%
630	35	25	21,04	98,45%	82,20%	83,50%	93,52%	3,52	3,16	0,14%	2,66%	13,70%
640	35	25	21,15	98,30%	81,19%	82,60%	93,98%	3,73	3,37	0,16%	2,77%	14,47%
650	35	25	21,24	98,14%	80,18%	81,70%	94,41%	3,93	3,57	0,19%	2,88%	15,23%
660	36	26	21,13	98,51%	82,01%	83,25%	93,92%	3,57	3,23	0,17%	2,72%	13,86%
670	36	26	21,23	98,37%	81,03%	82,37%	94,34%	3,76	3,42	0,20%	2,83%	14,60%
680	36	26	21,32	98,22%	80,06%	81,51%	94,74%	3,96	3,62	0,23%	2,93%	15,33%
690	37	27	21,21	98,58%	81,83%	83,01%	94,28%	3,61	3,28	0,21%	2,78%	14,01%
700	37	27	21,30	98,45%	80,89%	82,16%	94,68%	3,80	3,47	0,24%	2,88%	14,72%
710	38	28	21,20	98,76%	82,56%	83,60%	94,22%	3,47	3,15	0,21%	2,73%	13,45%
720	38	28	21,29	98,64%	81,66%	82,79%	94,61%	3,65	3,33	0,25%	2,83%	14,14%
730	38	28	21,37	98,52%	80,76%	81,97%	94,98%	3,83	3,52	0,28%	2,93%	14,82%
740	39	29	21,27	98,81%	82,38%	83,37%	94,55%	3,50	3,20	0,26%	2,78%	13,59%
750	39	29	21,36	98,71%	81,51%	82,58%	94,91%	3,68	3,38	0,29%	2,88%	14,25%
760	39	29	21,43	98,60%	80,63%	81,78%	95,25%	3,86	3,56	0,33%	2,98%	14,91%
770	40	30	21,34	98,87%	82,21%	83,15%	94,85%	3,54	3,25	0,30%	2,83%	13,72%
780	40	30	21,42	98,78%	81,37%	82,38%	95,19%	3,71	3,43	0,34%	2,93%	14,35%
790	40	30	21,49	98,67%	80,52%	81,61%	95,51%	3,88	3,60	0,39%	3,02%	14,99%
800	41	31	21,40	98,93%	82,06%	82,94%	95,13%	3,57	3,30	0,35%	2,88%	13,83%
810	41	31	21,48	98,84%	81,24%	82,19%	95,45%	3,74	3,47	0,40%	2,97%	14,44%
820	41	31	21,54	98,75%	80,42%	81,44%	95,74%	3,90	3,64	0,44%	3,06%	15,05%
830	42	32	21,46	98,99%	81,91%	82,74%	95,39%	3,60	3,34	0,40%	2,93%	13,92%
840	42	32	21,53	98,91%	81,12%	82,01%	95,68%	3,76	3,51	0,45%	3,02%	14,52%
850	42	32	21,59	98,82%	80,33%	81,28%	95,96%	3,92	3,67	0,51%	3,10%	15,11%
860	43	33	21,51	99,05%	81,77%	82,56%	95,62%	3,63	3,38	0,46%	2,97%	14,01%
870	43	33	21,58	98,98%	81,01%	81,84%	95,90%	3,78	3,54	0,51%	3,06%	14,58%
880	43	33	21,64	98,90%	80,24%	81,13%	96,16%	3,93	3,70	0,57%	3,14%	15,15%
890	44	34	21,56	99,11%	81,64%	82,38%	95,84%	3,65	3,41	0,52%	3,01%	14,09%
900	44	34	21,62	99,04%	80,90%	81,68%	96,10%	3,80	3,57	0,58%	3,10%	14,64%
910	44	34	21,68	98,97%	80,16%	80,99%	96,34%	3,95	3,73	0,64%	3,18%	15,19%
920	45	35	21,61	99,16%	81,52%	82,21%	96,04%	3,67	3,45	0,59%	3,05%	14,15%
930	45	35	21,66	99,10%	80,80%	81,53%	96,29%	3,82	3,60	0,65%	3,13%	14,68%
940	45	35	21,72	99,04%	80,08%	80,86%	96,52%	3,96	3,75	0,72%	3,21%	15,21%
950	46	36	21,65	99,22%	81,41%	82,05%	96,23%	3,69	3,48	0,66%	3,09%	14,20%
960	46	36	21,70	99,17%	80,71%	81,39%	96,46%	3,83	3,63	0,72%	3,17%	14,72%
970	46	36	21,75	99,11%	80,01%	80,73%	96,68%	3,97	3,78	0,80%	3,24%	15,23%
980	47	37	21,69	99,27%	81,30%	81,89%	96,40%	3,71	3,51	0,73%	3,13%	14,25%
990	47	37	21,74	99,22%	80,62%	81,25%	96,62%	3,84	3,65	0,80%	3,20%	14,75%
1000	48	38	21,68	99,37%	81,86%	82,38%	96,35%	3,59	3,39	0,73%	3,09%	13,80%

Anzahl Anrufe	Leitungsanzahl	Agentenanzahl	bediente Kunden pro Agent	Service Level			Auslastung der Agenten	erwartete Wartezeit		Wahrscheinlichkeit		
				bedienter Kunden	anrufernder Kunden	Erreichbarkeit		ankommender Kunden	bedienter Kunden	des Blockierens	zurückzusehen	aufzulegen
1010	48	38	21,73	99,33%	81,20%	81,75%	96,57%	3,72	3,53	0,81%	3,16%	14,29%
1020	48	38	21,77	99,28%	80,53%	81,12%	96,77%	3,85	3,67	0,88%	3,23%	14,77%
1030	49	39	21,72	99,42%	81,74%	82,22%	96,51%	3,60	3,42	0,81%	3,12%	13,84%
1040	49	39	21,76	99,38%	81,10%	81,61%	96,72%	3,73	3,55	0,89%	3,19%	14,31%
1050	49	39	21,81	99,34%	80,45%	80,99%	96,91%	3,86	3,69	0,97%	3,26%	14,78%
1060	50	40	21,75	99,46%	81,63%	82,08%	96,67%	3,62	3,44	0,89%	3,15%	13,88%
1070	50	40	21,79	99,43%	81,00%	81,47%	96,86%	3,74	3,57	0,97%	3,22%	14,33%
1080	50	40	21,83	99,39%	80,37%	80,87%	97,04%	3,86	3,71	1,06%	3,29%	14,78%
1090	51	41	21,78	99,50%	81,53%	81,93%	96,81%	3,63	3,46	0,97%	3,19%	13,91%
1100	51	41	21,82	99,47%	80,91%	81,34%	96,99%	3,75	3,59	1,06%	3,25%	14,35%
1110	51	41	21,86	99,44%	80,30%	80,75%	97,17%	3,87	3,72	1,15%	3,32%	14,78%
1120	52	42	21,81	99,54%	81,42%	81,80%	96,94%	3,64	3,48	1,06%	3,22%	13,93%
1130	52	42	21,85	99,52%	80,82%	81,22%	97,12%	3,76	3,61	1,15%	3,28%	14,36%
1140	52	42	21,89	99,49%	80,23%	80,64%	97,28%	3,87	3,74	1,24%	3,34%	14,78%
1150	53	43	21,84	99,58%	81,32%	81,67%	97,07%	3,65	3,50	1,15%	3,24%	13,95%
1160	53	43	21,88	99,56%	80,74%	81,10%	97,23%	3,76	3,62	1,24%	3,31%	14,36%
1170	53	43	21,91	99,53%	80,16%	80,53%	97,39%	3,87	3,75	1,33%	3,37%	14,76%
1180	54	44	21,87	99,62%	81,23%	81,54%	97,19%	3,65	3,52	1,24%	3,27%	13,95%
1190	54	44	21,90	99,59%	80,66%	80,98%	97,34%	3,76	3,64	1,33%	3,33%	14,35%
1200	54	44	21,94	99,57%	80,09%	80,43%	97,49%	3,87	3,76	1,43%	3,39%	14,74%
1210	55	45	21,89	99,65%	81,13%	81,42%	97,30%	3,66	3,53	1,33%	3,30%	13,96%
1220	55	45	21,93	99,63%	80,57%	80,87%	97,45%	3,77	3,65	1,43%	3,36%	14,34%
1230	55	45	21,96	99,61%	80,02%	80,33%	97,59%	3,87	3,76	1,53%	3,41%	14,72%
1240	56	46	21,92	99,68%	81,04%	81,30%	97,40%	3,66	3,54	1,42%	3,32%	13,95%
1250	56	46	21,95	99,66%	80,50%	80,77%	97,54%	3,77	3,66	1,53%	3,38%	14,33%
1260	57	47	21,91	99,73%	81,49%	81,71%	97,36%	3,56	3,44	1,42%	3,29%	13,58%
1270	57	47	21,94	99,71%	80,95%	81,19%	97,50%	3,66	3,55	1,52%	3,35%	13,94%
1280	57	47	21,97	99,70%	80,42%	80,66%	97,64%	3,77	3,66	1,63%	3,40%	14,31%
1290	58	48	21,93	99,75%	81,39%	81,59%	97,46%	3,57	3,45	1,52%	3,31%	13,58%
1300	58	48	21,96	99,74%	80,87%	81,08%	97,59%	3,67	3,56	1,62%	3,37%	13,93%
1310	58	48	21,99	99,73%	80,34%	80,57%	97,72%	3,76	3,67	1,73%	3,42%	14,28%
1320	59	49	21,95	99,78%	81,30%	81,48%	97,55%	3,57	3,46	1,61%	3,34%	13,57%
1330	59	49	21,98	99,76%	80,78%	80,97%	97,68%	3,67	3,57	1,72%	3,39%	13,91%
1340	59	49	22,01	99,75%	80,27%	80,47%	97,80%	3,76	3,68	1,84%	3,44%	14,25%
1350	60	50	21,97	99,80%	81,20%	81,37%	97,64%	3,57	3,47	1,71%	3,36%	13,56%
1360	60	50	22,00	99,79%	80,70%	80,87%	97,77%	3,67	3,58	1,83%	3,41%	13,89%
1370	60	50	22,02	99,78%	80,20%	80,38%	97,88%	3,76	3,68	1,94%	3,46%	14,22%
1380	61	51	21,99	99,82%	81,11%	81,26%	97,73%	3,57	3,48	1,81%	3,38%	13,55%
1390	61	51	22,01	99,81%	80,62%	80,77%	97,84%	3,66	3,58	1,93%	3,43%	13,87%
1400	61	51	22,04	99,80%	80,13%	80,29%	97,96%	3,75	3,68	2,05%	3,48%	14,18%
1410	62	52	22,01	99,84%	81,03%	81,16%	97,81%	3,57	3,49	1,92%	3,40%	13,53%
1420	62	52	22,03	99,83%	80,54%	80,68%	97,92%	3,66	3,58	2,04%	3,45%	13,84%
1430	62	52	22,06	99,82%	80,06%	80,20%	98,02%	3,75	3,68	2,16%	3,50%	14,14%
1440	63	53	22,02	99,85%	80,94%	81,06%	97,88%	3,57	3,49	2,02%	3,42%	13,50%
1450	63	53	22,05	99,85%	80,46%	80,59%	97,99%	3,66	3,59	2,14%	3,47%	13,80%
1460	64	54	22,02	99,88%	81,32%	81,43%	97,85%	3,48	3,40	2,01%	3,39%	13,18%
1470	64	54	22,04	99,87%	80,86%	80,96%	97,95%	3,57	3,50	2,13%	3,44%	13,48%
1480	64	54	22,06	99,86%	80,39%	80,50%	98,06%	3,65	3,59	2,25%	3,48%	13,77%
1490	65	55	22,03	99,89%	81,23%	81,32%	97,92%	3,48	3,41	2,11%	3,41%	13,16%
1500	65	55	22,05	99,88%	80,77%	80,87%	98,02%	3,56	3,50	2,23%	3,45%	13,45%

## 9.2 Darstellung der Saisonfaktoren

Woche	Call Center einer Bank	abgeleitet aus realem Call Center	Gleichverteilung	Normalverteilung (10000, 1500)	Normalverteilung (30000, 2400)
1	1,07	1,06	0,65	1,08	1,05
2	1,22	1,12	0,82	0,67	1,00
3	0,96	1,13	0,66	1,04	0,93
4	0,94	1,11	0,86	1,31	0,89
5	0,96	1,11	0,78	1,06	0,97
6	1,01	1,26	0,60	1,27	0,82
7	0,86	1,18	0,77	0,97	1,07
8	0,96	1,06	0,88	1,25	0,99
9	1,07	0,97	0,62	0,82	1,09
10	0,96	0,90	0,79	1,28	0,91
11	0,88	0,96	1,08	0,89	0,88
12	0,95	0,95	1,14	1,05	0,80
13	0,91	0,97	0,87	1,08	1,11
14	0,99	0,99	1,08	1,10	0,91
15	1,09	0,93	0,83	0,97	0,86
16	0,94	0,92	0,98	0,82	0,97
17	0,91	0,94	0,99	1,13	0,93
18	1,09	0,82	1,22	1,05	0,88
19	0,94	1,01	0,98	0,85	1,05
20	1,12	1,00	1,13	0,97	1,11
21	0,99	1,07	0,95	1,10	1,04
22	0,86	1,01	1,01	1,20	0,92
23	1,04	1,15	0,84	0,96	0,89
24	0,89	1,21	0,79	1,02	0,92
25	0,88	1,12	0,94	1,20	1,17
26	0,99	1,11	1,30	0,93	1,07
27	1,07	1,02	1,08	0,90	1,05
28	0,94	1,10	1,24	1,02	1,09
29	0,83	1,20	1,36	1,19	0,96
30	0,91	0,60	1,08	0,70	0,98
31	0,91	0,63	1,29	1,16	1,10
32	0,86	1,01	1,27	0,94	0,99
33	0,83	1,04	1,11	1,02	1,04
34	0,78	1,00	1,15	1,00	1,07
35	0,86	1,02	1,08	1,09	1,05
36	0,84	0,94	1,07	1,22	0,94
37	0,88	0,97	0,83	1,04	0,97
38	0,91	1,04	0,99	1,08	1,12
39	0,94	1,03	1,14	0,82	0,99
40	1,01	1,09	1,20	0,75	1,02
41	1,53	1,09	0,88	0,80	1,05
42	1,35	1,16	1,20	0,79	0,87
43	1,20	0,94	1,14	1,24	0,96
44	0,99	0,76	1,13	0,88	1,07
45	1,12	0,90	1,07	0,83	0,95
46	0,91	0,86	1,20	1,14	0,95
47	0,96	0,90	0,90	0,87	1,00
48	1,35	0,71	1,17	1,04	1,01
49	1,07	0,92	1,03	1,07	1,00
50	1,20	1,14	0,94	0,94	0,94
51	1,01	0,95	0,74	0,99	0,93
52	0,94	1,12	1,13	0,93	1,03

### 9.3 Ergebnisse der Verfahrensvarianten der Heuristik *relLB*

Testproblem	$z_{Anz}$	$z^{LP}$	$z^{relLB}$	$Gap^{LP}$	Anzahl an Arbeitnehmern der Mitarbeiterkategorie $k$			Lösungsdauer [Min]
					$k=1$	$k=2$	$k=3$	
<i>real</i>	10	116615	126003	8,05%	0	4	11	15,76
<i>real</i>	15	116615	127330	9,19%	1	4	9	15,93
<i>real</i>	20	116615	125401	7,53%	0	4	11	16,10
<i>real</i>	25	116615	138413	18,69%	1	4	11	16,26
<i>real</i>	<b>30</b>	116615	121038	3,79%	0	4	10	16,43
<i>real</i>	35	116615	137893	18,25%	1	5	9	16,56
<i>real</i>	40	116615	124579	6,83%	0	9	5	16,90
<i>real</i>	45	116615	132846	13,92%	1	5	8	17,16
<i>real</i>	50	116615	129808	11,31%	0	5	10	17,48
<i>künstl</i> <sub>1</sub>	<b>10</b>	157371	163364	3,81%	8	0	6	16,70
<i>künstl</i> <sub>1</sub>	15	157371	164243	4,37%	8	0	6	16,85
<i>künstl</i> <sub>1</sub>	20	157371	164178	4,33%	8	0	6	17,06
<i>künstl</i> <sub>1</sub>	25	157371	168357	6,98%	8	0	7	17,13
<i>künstl</i> <sub>1</sub>	30	157371	168228	6,90%	8	0	7	17,23
<i>künstl</i> <sub>1</sub>	35	157371	168426	7,02%	8	0	7	17,35
<i>künstl</i> <sub>1</sub>	40	157371	168224	6,90%	8	0	7	17,46
<i>künstl</i> <sub>1</sub>	45	157371	168441	7,03%	8	0	7	17,60
<i>künstl</i> <sub>1</sub>	50	157371	167900	6,69%	8	0	7	17,72
<i>künstl</i> <sub>2</sub>	10	157401	177347	12,67%	4	7	4	16,03
<i>künstl</i> <sub>2</sub>	15	157401	174417	10,81%	3	8	4	16,20
<i>künstl</i> <sub>2</sub>	20	157401	163043	3,58%	3	7	4	16,42
<i>künstl</i> <sub>2</sub>	25	157401	162474	3,22%	3	7	4	16,63
<i>künstl</i> <sub>2</sub>	30	157401	162626	3,32%	3	7	4	16,82
<i>künstl</i> <sub>2</sub>	<b>35</b>	157401	162352	3,15%	3	7	4	16,98
<i>künstl</i> <sub>2</sub>	40	157401	162360	3,15%	3	7	4	17,20
<i>künstl</i> <sub>2</sub>	45	157401	162466	3,22%	3	7	4	17,33
<i>künstl</i> <sub>2</sub>	50	157401	162622	3,32%	3	7	4	17,45
<i>künstl</i> <sub>3</sub>	10	157916	171878	8,84%	7	3	4	15,90
<i>künstl</i> <sub>3</sub>	<b>15</b>	157916	165809	5,00%	7	3	3	16,05
<i>künstl</i> <sub>3</sub>	20	157916	172187	9,04%	7	3	4	16,28
<i>künstl</i> <sub>3</sub>	25	157916	166070	5,16%	7	3	3	16,35
<i>künstl</i> <sub>3</sub>	30	157916	177670	12,51%	7	4	3	16,55
<i>künstl</i> <sub>3</sub>	35	157916	177534	12,42%	7	4	3	16,75
<i>künstl</i> <sub>3</sub>	40	157916	177560	12,44%	7	4	3	16,88
<i>künstl</i> <sub>3</sub>	45	157916	177518	12,41%	7	4	3	7,31
<i>künstl</i> <sub>3</sub>	50	157916	177542	12,43%	7	4	3	17,23
<i>künstl</i> <sub>4</sub>	<b>10</b>	158502	166584	5,10%	2	8	5	16,01
<i>künstl</i> <sub>4</sub>	15	158502	167152	5,46%	2	8	5	16,23
<i>künstl</i> <sub>4</sub>	20	158502	168458	6,28%	3	8	3	16,46
<i>künstl</i> <sub>4</sub>	25	158502	174417	10,04%	3	8	4	16,60
<i>künstl</i> <sub>4</sub>	30	158502	168898	6,56%	3	8	3	16,78
<i>künstl</i> <sub>4</sub>	35	158502	168070	6,04%	3	8	3	16,98
<i>künstl</i> <sub>4</sub>	40	158502	167927	5,95%	3	8	3	17,32
<i>künstl</i> <sub>4</sub>	45	158502	168562	6,35%	3	8	3	17,46
<i>künstl</i> <sub>4</sub>	50	158502	169059	6,66%	3	8	3	17,66

Testproblem	$z_{Anz}$	$z^{LP}$	$z^{relLB}$	$Gap^{LP}$	Anzahl an Arbeitnehmern der Mitarbeiterkategorie $k$			Lösungsdauer [Min]
					$k=1$	$k=2$	$k=3$	
<i>künstl</i> <sub>5</sub>	10	185210	193899	4,69%	0	11	8	16,03
<i>künstl</i> <sub>5</sub>	15	185210	197177	6,46%	1	11	6	16,30
<i>künstl</i> <sub>5</sub>	20	185210	201822	8,97%	1	11	7	16,53
<i>künstl</i> <sub>5</sub>	25	185210	201798	8,96%	1	11	7	17,21
<i>künstl</i> <sub>5</sub>	30	185210	199295	7,60%	0	12	7	18,02
<i>künstl</i> <sub>5</sub>	<b>35</b>	185210	189279	2,20%	0	11	7	18,58
<i>künstl</i> <sub>5</sub>	40	185210	196237	5,95%	1	11	6	19,03
<i>künstl</i> <sub>5</sub>	45	185210	193129	4,28%	0	12	6	19,60
<i>künstl</i> <sub>5</sub>	50	185210	192913	4,16%	0	12	6	20,15
<i>künstl</i> <sub>6</sub>	10	373808	381480	2,05%	5	0	46	17,22
<i>künstl</i> <sub>6</sub>	15	373808	384232	2,79%	6	0	44	18,40
<i>künstl</i> <sub>6</sub>	20	373808	379874	1,62%	5	0	46	18,68
<i>künstl</i> <sub>6</sub>	25	373808	380303	1,74%	5	0	46	18,60
<i>künstl</i> <sub>6</sub>	30	373808	380037	1,67%	5	0	46	18,75
<i>künstl</i> <sub>6</sub>	<b>35</b>	373808	379795	1,60%	5	0	46	18,90
<i>künstl</i> <sub>6</sub>	40	373808	380256	1,72%	5	0	46	19,02
<i>künstl</i> <sub>6</sub>	45	373808	380075	1,68%	5	0	46	19,41
<i>künstl</i> <sub>6</sub>	50	373808	380018	1,66%	5	0	46	19,41
<i>künstl</i> <sub>7</sub>	<b>10</b>	373314	378417	1,37%	19	0	13	16,80
<i>künstl</i> <sub>7</sub>	15	373314	378807	1,47%	19	0	13	16,95
<i>künstl</i> <sub>7</sub>	20	373314	382296	2,41%	19	0	14	17,05
<i>künstl</i> <sub>7</sub>	25	373314	382556	2,48%	19	0	14	17,20
<i>künstl</i> <sub>7</sub>	30	373314	378685	1,44%	19	0	13	17,31
<i>künstl</i> <sub>7</sub>	35	373314	381524	2,20%	19	0	14	6,48
<i>künstl</i> <sub>7</sub>	40	373314	381793	2,27%	19	0	14	17,63
<i>künstl</i> <sub>7</sub>	45	373314	381425	2,17%	19	0	14	5,61
<i>künstl</i> <sub>7</sub>	50	373314	381430	2,17%	19	0	14	4,60
<i>künstl</i> <sub>8</sub>	10	374004	385762	3,14%	17	1	17	16,51
<i>künstl</i> <sub>8</sub>	15	374004	382624	2,30%	18	0	16	16,62
<i>künstl</i> <sub>8</sub>	20	374004	382254	2,21%	18	0	16	16,75
<i>künstl</i> <sub>8</sub>	25	374004	382281	2,21%	18	0	16	16,90
<i>künstl</i> <sub>8</sub>	30	374004	382143	2,18%	18	0	16	17,11
<i>künstl</i> <sub>8</sub>	35	374004	382233	2,20%	18	0	16	17,15
<i>künstl</i> <sub>8</sub>	<b>40</b>	374004	381940	2,12%	18	0	16	17,30
<i>künstl</i> <sub>8</sub>	45	374004	382225	2,20%	18	0	16	17,48
<i>künstl</i> <sub>8</sub>	50	374004	382231	2,20%	18	0	16	17,56
<i>künstl</i> <sub>9</sub>	10	368742	395901	7,37%	7	17	11	15,91
<i>künstl</i> <sub>9</sub>	<b>15</b>	368742	378050	2,52%	7	15	12	16,08
<i>künstl</i> <sub>9</sub>	20	368742	385706	4,60%	8	15	11	14,90
<i>künstl</i> <sub>9</sub>	25	368742	385540	4,56%	8	15	11	16,50
<i>künstl</i> <sub>9</sub>	30	368742	385720	4,60%	8	15	11	16,70
<i>künstl</i> <sub>9</sub>	35	368742	385534	4,55%	8	15	11	16,90
<i>künstl</i> <sub>9</sub>	40	368742	385976	4,67%	8	15	11	7,08
<i>künstl</i> <sub>9</sub>	45	368742	391970	6,30%	8	15	12	2,40
<i>künstl</i> <sub>9</sub>	50	368742	391968	6,30%	8	15	12	2,61

Testproblem	$z_{Anz}$	$z^{LP}$	$z^{relLB}$	$Gap^{LP}$	Anzahl an Arbeitnehmern der Mitarbeiterkategorie $k$			Lösungsdauer [Min]
					$k=1$	$k=2$	$k=3$	
<i>künstl</i> <sub>10</sub>	10	385091	408276	6,02%	8	17	10	16,03
<i>künstl</i> <sub>10</sub>	15	385091	395186	2,62%	8	16	10	16,22
<i>künstl</i> <sub>10</sub>	20	385091	394623	2,48%	8	16	10	16,68
<i>künstl</i> <sub>10</sub>	<b>25</b>	385091	394300	2,39%	8	16	10	16,68
<i>künstl</i> <sub>10</sub>	30	385091	394569	2,46%	8	16	10	16,80
<i>künstl</i> <sub>10</sub>	35	385091	394369	2,41%	8	16	10	17,11
<i>künstl</i> <sub>10</sub>	40	385091	394377	2,41%	8	16	10	17,30
<i>künstl</i> <sub>10</sub>	45	385091	394520	2,45%	8	16	10	17,50
<i>künstl</i> <sub>10</sub>	50	385091	394693	2,49%	8	16	10	17,60
<i>künstl</i> <sub>11</sub>	5	373816	381038	1,93%	5	0	46	16,60
<i>künstl</i> <sub>11</sub>	10	373816	380557	1,80%	5	0	46	15,50
<i>künstl</i> <sub>11</sub>	15	373816	380592	1,81%	5	0	46	18,95
<i>künstl</i> <sub>11</sub>	20	373816	380406	1,76%	5	0	46	17,30
<i>künstl</i> <sub>11</sub>	25	373816	380503	1,79%	5	0	46	17,48
<i>künstl</i> <sub>11</sub>	30	373816	380368	1,75%	5	0	46	17,56
<i>künstl</i> <sub>11</sub>	35	373816	380494	1,79%	5	0	46	17,75
<i>künstl</i> <sub>11</sub>	40	373816	380157	1,70%	5	0	46	17,90
<i>künstl</i> <sub>11</sub>	45	373816	380127	1,69%	5	0	46	18,00
<i>künstl</i> <sub>11</sub>	<b>50</b>	373816	379842	1,61%	5	0	46	18,15
<i>künstl</i> <sub>11</sub>	<b>60</b>	373816	379817	1,61%	5	0	46	18,41
<i>künstl</i> <sub>12</sub>	10	373076	388959	4,26%	17	4	12	15,80
<i>künstl</i> <sub>12</sub>	15	373076	396134	6,18%	17	4	13	16,06
<i>künstl</i> <sub>12</sub>	20	373076	383983	2,92%	17	3	13	16,22
<i>künstl</i> <sub>12</sub>	25	373076	383512	2,80%	17	3	13	16,41
<i>künstl</i> <sub>12</sub>	30	373076	391483	4,93%	18	3	12	16,55
<i>künstl</i> <sub>12</sub>	<b>35</b>	373076	378699	1,51%	17	3	12	16,65
<i>künstl</i> <sub>12</sub>	40	373076	378801	1,53%	17	3	12	16,76
<i>künstl</i> <sub>12</sub>	45	373076	382690	2,58%	17	3	13	8,23
<i>künstl</i> <sub>12</sub>	50	373076	382729	2,59%	17	3	13	4,46
<i>künstl</i> <sub>13</sub>	10	374259	384396	2,71%	16	0	21	17,06
<i>künstl</i> <sub>13</sub>	15	374259	390291	4,28%	16	0	22	18,01
<i>künstl</i> <sub>13</sub>	<b>20</b>	374259	380598	1,69%	16	0	20	18,26
<i>künstl</i> <sub>13</sub>	25	374259	381303	1,88%	16	0	20	18,45
<i>künstl</i> <sub>13</sub>	30	374259	382408	2,18%	16	0	20	18,68
<i>künstl</i> <sub>13</sub>	35	374259	384136	2,64%	16	0	21	18,60
<i>künstl</i> <sub>13</sub>	40	374259	381776	2,01%	16	0	20	18,73
<i>künstl</i> <sub>13</sub>	45	374259	381961	2,06%	16	0	20	18,88
<i>künstl</i> <sub>13</sub>	50	374259	384375	2,70%	16	0	21	15,05
<i>künstl</i> <sub>14</sub>	10	368417	389934	5,84%	2	22	12	16,03
<i>künstl</i> <sub>14</sub>	15	368417	390148	5,90%	2	22	12	16,23
<i>künstl</i> <sub>14</sub>	20	368417	377972	2,59%	2	21	12	16,43
<i>künstl</i> <sub>14</sub>	25	368417	377391	2,44%	2	21	12	16,62
<i>künstl</i> <sub>14</sub>	30	368417	377387	2,43%	2	21	12	16,73
<i>künstl</i> <sub>14</sub>	35	368417	377284	2,41%	2	21	12	16,88
<i>künstl</i> <sub>14</sub>	40	368417	377217	2,39%	2	21	12	16,98
<i>künstl</i> <sub>14</sub>	45	368417	377174	2,38%	2	21	12	17,10
<i>künstl</i> <sub>14</sub>	<b>50</b>	368417	377132	2,37%	2	21	12	17,00
<i>künstl</i> <sub>14</sub>	60	368417	377259	2,40%	2	21	12	17,55





<i>trelBrJo</i>		Agent Nr.			Agent Nr.			Agent Nr.							
Woche $w$	$x_{abw_{1,w}}$	1	2	3	$x_{abw_{2,w}}$	1	2	$x_{abw_{3,w}}$	1	2	3	4	5	6	7
1	1				0			0							
2	0				0			1							
3	1				0			1							
4	0				0			0							
5	0				0			1							
6	0				0			0							
7	0				0			0							
8	1				0			1							
9	1				0			2							
10	2				0			0							
11	1				0			1							
12	0				0			0							
13	0				1			0							
14	0				1			1							
15	1				0			0							
16	0				0			3							
17	0				0			1							
18	1				1			1							
19	0				0			3							
20	0				0			0							
21	0				1			1							
22	0				0			0							
23	0				1			0							
24	0				1			0							
25	0				0			0							
26	1				0			1							
27	0				0			2							
28	0				0			1							
29	0				0			2							
30	3				0			1							
31	2				1			0							
32	0				0			3							
33	0				0			2							
34	0				1			0							
35	1				0			0							
36	0				1			0							
37	1				0			1							
38	0				0			1							
39	1				0			0							
40	0				0			2							
41	0				0			3							
42	0				0			0							
43	0				1			1							
44	1				1			1							
45	0				0			0							
46	0				0			3							
47	1				0			2							
48	1				2			1							
49	0				0			4							
50	0				0			0							
51	0				1			1							
52	0				0			0							



## 9.5 Personaleinsatzplan der Woche 17 für die Tage Dienstag bis Freitag

Uhrzeit	$y_{2,s}$									$E_t$	$B_{1,2}$
	567	617	325	256	623	631	422	346	279		
06:30	1	0	0	0	0	0	0	0	0	1	1
06:45	1	0	0	0	0	0	0	0	0	1	1
07:00	1	0	0	0	0	0	0	0	0	1	1
07:15	1	0	0	0	0	0	0	0	0	1	1
07:30	1	0	0	0	0	0	0	0	0	1	1
07:45	1	1	0	0	0	0	0	0	0	2	2
08:00	1	1	0	0	0	0	0	0	0	2	2
08:15	0	1	1	0	0	0	0	0	0	2	2
08:30	1	1	1	0	0	0	0	0	0	3	2
08:45	1	1	1	0	0	0	0	0	0	3	3
09:00	1	1	1	0	0	0	0	0	0	3	2
09:15	1	0	1	1	1	0	0	0	0	4	4
09:30	1	1	1	1	1	0	0	0	0	5	4
09:45	1	1	1	1	1	0	0	0	0	5	4
10:00	1	1	1	1	1	0	0	0	0	5	4
10:15	1	1	1	1	1	0	0	0	0	5	4
10:30	1	1	0	1	1	0	0	0	0	4	4
10:45	1	1	1	1	1	0	0	0	0	5	3
11:00	0	1	1	1	1	0	0	0	0	4	3
11:15	0	1	1	0	1	1	0	0	0	4	4
11:30	0	1	1	1	0	1	0	0	0	4	3
11:45	0	1	1	1	1	1	0	0	0	5	3
12:00	0	0	1	1	1	1	0	0	0	4	3
12:15	0	0	1	1	1	1	0	0	0	4	4
12:30	0	0	1	0	1	1	0	0	0	3	2
12:45	0	0	1	0	1	1	1	0	0	4	3
13:00	0	0	1	1	1	0	1	0	0	4	3
13:15	0	0	1	1	1	1	1	0	0	5	4
13:30	0	0	1	1	0	1	1	1	0	5	3
13:45	0	0	1	1	0	1	1	1	0	5	4
14:00	0	0	1	1	0	1	1	1	0	5	3
14:15	0	0	0	1	0	1	1	1	0	4	3
14:30	0	0	0	1	0	1	1	1	0	4	3
14:45	0	0	0	1	0	1	1	1	0	4	4
15:00	0	0	0	1	0	1	0	0	1	3	3
15:15	0	0	0	1	0	1	1	1	1	5	4
15:30	0	0	0	1	0	0	1	1	1	4	3
15:45	0	0	0	1	0	0	1	1	1	4	3
16:00	0	0	0	1	0	0	1	1	1	4	4
16:15	0	0	0	0	0	0	1	1	1	3	3
16:30	0	0	0	0	0	0	1	1	1	3	3
16:45	0	0	0	0	0	0	1	1	1	3	3
17:00	0	0	0	0	0	0	1	1	0	2	2
17:15	0	0	0	0	0	0	1	1	1	3	3
17:30	0	0	0	0	0	0	1	1	1	3	3
17:45	0	0	0	0	0	0	1	1	1	3	2
18:00	0	0	0	0	0	0	1	1	1	3	3
18:15	0	0	0	0	0	0	0	1	1	2	2
18:30	0	0	0	0	0	0	0	1	1	2	2
18:45	0	0	0	0	0	0	0	1	0	1	1
19:00	0	0	0	0	0	0	0	1	0	1	1
19:15	0	0	0	0	0	0	0	1	1	2	2
19:30	0	0	0	0	0	0	0	0	1	1	1
19:45	0	0	0	0	0	0	0	0	1	1	1
20:00	0	0	0	0	0	0	0	0	1	1	1
20:15	0	0	0	0	0	0	0	0	1	1	1
20:30	0	0	0	0	0	0	0	0	1	1	1
20:45	0	0	0	0	0	0	0	0	1	1	1
21:00	0	0	0	0	0	0	0	0	1	1	1
21:15	0	0	0	0	0	0	0	0	1	1	1
21:30	0	0	0	0	0	0	0	0	1	1	1
21:45	0	0	0	0	0	0	0	0	1	1	1
Arbeitszeit	4,25	4	5,75	6,25	4	4	5,25	5,75	6,25	$\Sigma$ 182	154

Uhrzeit	$y_{3,5}$									$E_t$	$B_{1,3}$
	318	617	325	328	331	544	641	600	396		
06:30	1	0	0	0	0	0	0	0	0	1	1
06:45	1	0	0	0	0	0	0	0	0	1	1
07:00	1	0	0	0	0	0	0	0	0	1	1
07:15	1	0	0	0	0	0	0	0	0	1	1
07:30	1	0	0	0	0	0	0	0	0	1	1
07:45	1	1	0	0	0	0	0	0	0	2	2
08:00	1	1	0	0	0	0	0	0	0	2	2
08:15	0	1	1	0	0	0	0	0	0	2	2
08:30	1	1	1	0	0	0	0	0	0	3	3
08:45	1	1	1	0	0	0	0	0	0	3	3
09:00	1	1	1	1	0	0	0	0	0	4	4
09:15	1	0	1	1	0	0	0	0	0	3	3
09:30	1	1	1	1	0	0	0	0	0	4	3
09:45	1	1	1	1	1	0	0	0	0	5	4
10:00	1	1	0	1	1	0	0	0	0	4	3
10:15	1	1	1	1	1	0	0	0	0	5	4
10:30	1	1	1	1	1	0	0	0	0	5	4
10:45	1	1	1	0	1	0	0	0	0	4	3
11:00	1	1	1	1	1	0	0	0	0	5	5
11:15	1	1	1	1	1	0	0	0	0	5	3
11:30	1	1	1	1	1	0	0	0	0	5	4
11:45	1	1	1	1	1	1	0	0	0	6	5
12:00	1	0	1	1	0	1	0	0	0	4	3
12:15	1	0	1	1	1	1	0	0	0	5	4
12:30	0	0	1	1	1	1	0	0	0	4	4
12:45	0	0	1	1	1	1	0	0	0	4	3
13:00	0	0	1	1	1	1	0	0	0	4	3
13:15	0	0	1	1	1	0	0	0	0	3	3
13:30	0	0	1	1	1	1	0	0	0	4	4
13:45	0	0	1	1	1	1	1	0	0	5	3
14:00	0	0	1	1	1	1	1	0	0	5	4
14:15	0	0	0	1	1	1	1	0	0	4	4
14:30	0	0	0	1	1	1	1	0	0	4	3
14:45	0	0	0	1	1	1	1	1	0	5	4
15:00	0	0	0	0	1	1	1	1	0	4	4
15:15	0	0	0	0	1	1	1	1	0	4	3
15:30	0	0	0	0	1	1	1	1	0	4	3
15:45	0	0	0	0	0	1	1	1	0	3	3
16:00	0	0	0	0	0	1	0	1	0	2	2
16:15	0	0	0	0	0	1	1	1	1	4	3
16:30	0	0	0	0	0	0	1	0	1	2	2
16:45	0	0	0	0	0	0	1	1	1	3	3
17:00	0	0	0	0	0	0	1	1	1	3	3
17:15	0	0	0	0	0	0	1	1	1	3	3
17:30	0	0	0	0	0	0	1	1	1	3	2
17:45	0	0	0	0	0	0	1	1	0	2	2
18:00	0	0	0	0	0	0	0	1	1	2	2
18:15	0	0	0	0	0	0	0	1	1	2	2
18:30	0	0	0	0	0	0	0	1	1	2	2
18:45	0	0	0	0	0	0	0	1	1	2	2
19:00	0	0	0	0	0	0	0	1	1	2	2
19:15	0	0	0	0	0	0	0	0	1	1	1
19:30	0	0	0	0	0	0	0	0	1	1	1
19:45	0	0	0	0	0	0	0	0	1	1	1
20:00	0	0	0	0	0	0	0	0	1	1	1
20:15	0	0	0	0	0	0	0	0	1	1	1
20:30	0	0	0	0	0	0	0	0	1	1	1
20:45	0	0	0	0	0	0	0	0	1	1	1
21:00	0	0	0	0	0	0	0	0	1	1	1
21:15	0	0	0	0	0	0	0	0	1	1	1
21:30	0	0	0	0	0	0	0	0	1	1	1
21:45	0	0	0	0	0	0	0	0	1	1	1
Arbeitszeit	5,75	4	5,75	5,75	5,75	4,5	4	4,25	5,5	Σ 181	158

Uhrzeit	$y_{4,s}$								$E_t$	$B_{t,t}$
	318	217	364	219	261	505	557	566		
06:30	1	0	0	0	0	0	0	0	1	1
06:45	1	0	0	0	0	0	0	0	1	1
07:00	1	0	0	0	0	0	0	0	1	1
07:15	1	0	0	0	0	0	0	0	1	1
07:30	1	0	0	0	0	0	0	0	1	1
07:45	1	0	0	0	0	0	0	0	1	1
08:00	1	1	0	0	0	0	0	0	2	2
08:15	1	1	1	0	0	0	0	0	3	3
08:30	1	1	1	1	0	0	0	0	4	3
08:45	0	1	1	1	0	0	0	0	3	3
09:00	1	1	1	1	0	0	0	0	4	4
09:15	1	1	1	1	0	0	0	0	4	3
09:30	1	1	1	1	0	0	0	0	4	4
09:45	1	0	1	1	0	0	0	0	3	3
10:00	1	1	0	1	0	0	0	0	3	3
10:15	1	1	1	1	0	0	0	0	4	3
10:30	1	1	1	1	1	0	0	0	5	4
10:45	1	1	1	0	1	0	0	0	4	3
11:00	1	1	1	1	1	0	0	0	5	4
11:15	1	1	1	1	1	0	0	0	5	4
11:30	1	1	1	1	1	0	0	0	5	3
11:45	1	1	1	1	1	0	0	0	5	5
12:00	1	0	1	1	1	0	0	0	4	3
12:15	1	0	1	1	1	0	0	0	4	4
12:30	0	1	1	1	1	0	0	0	4	4
12:45	0	1	1	1	0	1	0	0	4	3
13:00	0	1	1	1	1	1	0	0	5	3
13:15	0	1	1	0	1	1	0	0	4	4
13:30	0	1	1	0	1	1	0	0	4	4
13:45	0	1	1	1	1	1	0	0	5	4
14:00	0	1	0	1	0	1	0	0	3	3
14:15	0	1	0	1	0	1	0	0	3	3
14:30	0	1	0	1	1	1	0	0	4	3
14:45	0	1	0	1	1	1	0	0	4	4
15:00	0	1	0	1	1	0	1	0	4	3
15:15	0	0	0	1	1	1	1	0	4	3
15:30	0	0	0	1	1	1	1	0	4	3
15:45	0	0	0	0	1	1	1	0	3	3
16:00	0	0	0	0	1	1	1	0	3	3
16:15	0	0	0	0	1	1	1	0	3	3
16:30	0	0	0	0	1	1	1	0	3	3
16:45	0	0	0	0	1	1	1	0	3	3
17:00	0	0	0	0	1	1	0	0	2	2
17:15	0	0	0	0	1	1	1	1	4	4
17:30	0	0	0	0	0	1	1	1	3	2
17:45	0	0	0	0	0	0	1	1	2	2
18:00	0	0	0	0	0	0	1	1	2	2
18:15	0	0	0	0	0	0	1	1	2	2
18:30	0	0	0	0	0	0	1	1	2	2
18:45	0	0	0	0	0	0	1	1	2	2
19:00	0	0	0	0	0	0	1	1	2	2
19:15	0	0	0	0	0	0	1	1	2	2
19:30	0	0	0	0	0	0	1	0	1	1
19:45	0	0	0	0	0	0	0	1	1	1
20:00	0	0	0	0	0	0	0	1	1	1
20:15	0	0	0	0	0	0	0	1	1	1
20:30	0	0	0	0	0	0	0	1	1	1
20:45	0	0	0	0	0	0	0	1	1	1
21:00	0	0	0	0	0	0	0	1	1	1
21:15	0	0	0	0	0	0	0	1	1	1
21:30	0	0	0	0	0	0	0	1	1	1
21:45	0	0	0	0	0	0	0	1	1	1
Arbeitszeit	5,75	6,5	5,5	6,5	6,25	4,75	4,5	4,5	$\Sigma$ 177	158

Uhrzeit	$y_{5,s}$								$E_t$	$B_{t,s}$
	397	618	253	329	257	462	601	356		
06:30	1	0	0	0	0	0	0	0	1	1
06:45	1	0	0	0	0	0	0	0	1	1
07:00	1	0	0	0	0	0	0	0	1	1
07:15	1	0	0	0	0	0	0	0	1	1
07:30	1	0	0	0	0	0	0	0	1	1
07:45	1	0	0	0	0	0	0	0	1	1
08:00	1	1	0	0	0	0	0	0	2	2
08:15	1	1	0	0	0	0	0	0	2	2
08:30	0	1	1	0	0	0	0	0	2	2
08:45	1	1	1	0	0	0	0	0	3	3
09:00	1	1	1	0	0	0	0	0	3	3
09:15	1	1	1	1	0	0	0	0	4	3
09:30	1	1	1	1	1	0	0	0	5	4
09:45	1	1	1	1	1	0	0	0	5	4
10:00	1	0	1	1	1	0	0	0	4	3
10:15	1	1	1	1	1	0	0	0	5	4
10:30	1	1	0	1	1	0	0	0	4	3
10:45	1	1	1	1	1	0	0	0	5	4
11:00	1	1	1	1	0	0	0	0	4	4
11:15	1	1	1	0	1	0	0	0	4	3
11:30	1	1	1	1	1	0	0	0	5	4
11:45	1	1	1	1	1	0	0	0	5	5
12:00	0	1	1	1	1	0	0	0	4	3
12:15	0	0	1	1	1	0	0	0	3	3
12:30	0	0	1	1	1	1	0	0	4	4
12:45	0	0	1	1	1	1	0	0	4	3
13:00	0	0	0	1	1	1	0	0	3	3
13:15	0	0	0	1	0	1	0	0	2	2
13:30	0	0	1	1	0	1	0	0	3	3
13:45	0	0	1	1	1	1	0	0	4	4
14:00	0	0	1	1	1	1	0	0	4	4
14:15	0	0	1	1	1	0	0	0	3	2
14:30	0	0	1	1	1	1	0	0	4	3
14:45	0	0	1	1	1	1	0	0	4	3
15:00	0	0	1	1	1	1	1	0	5	4
15:15	0	0	1	0	1	1	1	0	4	3
15:30	0	0	0	0	1	1	1	0	3	3
15:45	0	0	0	0	1	1	1	0	3	2
16:00	0	0	0	0	1	1	1	1	4	3
16:15	0	0	0	0	1	1	1	1	4	4
16:30	0	0	0	0	0	1	1	1	3	3
16:45	0	0	0	0	0	1	1	1	3	3
17:00	0	0	0	0	0	1	1	1	3	2
17:15	0	0	0	0	0	1	0	1	2	2
17:30	0	0	0	0	0	1	1	0	2	2
17:45	0	0	0	0	0	0	1	1	2	2
18:00	0	0	0	0	0	0	1	1	2	2
18:15	0	0	0	0	0	0	1	1	2	2
18:30	0	0	0	0	0	0	1	1	2	2
18:45	0	0	0	0	0	0	1	1	2	1
19:00	0	0	0	0	0	0	1	1	2	2
19:15	0	0	0	0	0	0	1	1	2	2
19:30	0	0	0	0	0	0	0	1	1	1
19:45	0	0	0	0	0	0	0	1	1	1
20:00	0	0	0	0	0	0	0	1	1	1
20:15	0	0	0	0	0	0	0	1	1	1
20:30	0	0	0	0	0	0	0	1	1	1
20:45	0	0	0	0	0	0	0	1	1	1
21:00	0	0	0	0	0	0	0	1	1	1
21:15	0	0	0	0	0	0	0	1	1	1
21:30	0	0	0	0	0	0	0	1	1	1
21:45	0	0	0	0	0	0	0	1	1	1
Arbeitszeit	5,25	4	6,25	5,75	6,25	5	4,25	5,75	$\Sigma$ 170	150