Computing assignment 2

Alyssa Vanderbeek

21 October 2019

Problem 1

	1	2	3	4	5
True DLT probability	0.017	0.043	0.100	0.220	0.410
Selection probability	0.065	0.202	0.335	0.315	0.023
Avg number of patients treated	3.144	3.241	2.959	2.311	1.001
Avg number of patients with DLT	0.052	0.159	0.311	0.503	0.391

Problem 2

Table 2: Performance metrics for 3+3 design when true DLT rates are p=0.10, 0.22, 0.41, 0.64, 0.81

	1	2	3	4	5
True DLT probability	0.100	0.220	0.410	0.640	0.810
Selection probability	0.422	0.377	0.085	0.005	0.000
Avg number of patients treated	3.699	2.730	1.249	0.190	0.010
Avg number of patients with DLT	0.405	0.607	0.520	0.123	0.008

Table 3: Performance metrics for 3+3 design when true DLT rates are p=0.043, 0.10, 0.22, 0.41, 0.64

	1	2	3	4	5
True DLT probability	0.043	0.100	0.220	0.410	0.640
Selection probability	0.176	0.373	0.352	0.074	0.001
Avg number of patients treated	3.322	3.190	2.578	1.078	0.183
Avg number of patients with DLT	0.141	0.307	0.575	0.468	0.113

Table 4: Performance metrics for 3+3 design when true DLT rates are p=0.007, 0.017, 0.043, 0.10, 0.22

	1	2	3	4	5
True DLT probability	0.007	0.017	0.043	0.100	0.220
Selection probability	0.023	0.050	0.184	0.349	0.122
Avg number of patients treated	3.063	3.039	3.142	3.064	2.328
Avg number of patients with DLT	0.021	0.038	0.128	0.325	0.522

Table 5: Performance metrics for 3+3 design when true DLT rates are p=0.003, 0.007, 0.017, 0.043, 0.10

	1	2	3	4	5
True DLT probability	0.003	0.007	0.017	0.043	0.100
Selection probability	0.006	0.020	0.066	0.166	0.187
Avg number of patients treated	3.018	3.033	3.087	3.057	3.128
Avg number of patients with DLT	0.006	0.017	0.056	0.120	0.343

Problem 3

Compared to the 3+3, the CRM is more consistent (less variable) in its selection of MTD. It therefore enrolls more patients at or near the target toxicity level (TTL), whereas the 3+3 does not allow specification of a TTL. But this comes at the cost of a larger overall sample size; n=31 in the CRM compared to an average N of 15.878 in the 3+3.

Under all 5 true scenarios, I establish the skeleton as 0, 0.003, 0.026, 0.1, 0.233 (I guess that the true MTD is the 4th dose, with halfwidth of 0.05). The average probability of correct selection (PCS) under this prior is 0.652.

Table 6: Performance metrics for 3+3 design when true DLT rates are p=0.017, 0.043, 0.10, 0.22, 0.41

	1	2	3	4	5
True DLT probability	0.017	0.043	0.10	0.22	0.41
Selection probability	0.020	0.160	0.62	0.20	0.00
Avg number of patients treated	1.800	5.580	13.68	7.84	2.10
Avg number of patients with DLT	0.060	0.360	1.24	1.40	0.94

Table 7: Performance metrics for 3+3 design when true DLT rates are p=0.10, 0.22, 0.41, 0.64, 0.81

	1	2	3	4	5
True DLT probability	0.10	0.22	0.41	0.64	0.81
Selection probability	0.78	0.22	0.00	0.00	0.00
Avg number of patients treated	19.68	8.24	2.30	0.60	0.18
Avg number of patients with DLT	1.86	1.72	0.94	0.44	0.16

Table 8: Performance metrics for 3+3 design when true DLT rates are p=0.043, 0.10, 0.22, 0.41, 0.64

	1	2	3	4	5
True DLT probability	0.043	0.10	0.22	0.41	0.64
Selection probability	0.220	0.52	0.26	0.00	0.00
Avg number of patients treated	6.520	13.66	8.04	1.76	1.02
Avg number of patients with DLT	0.360	1.16	1.62	0.74	0.52

Table 9: Performance metrics for 3+3 design when true DLT rates are p=0.007, 0.017, 0.043, 0.10, 0.22

	1	2	3	4	5
True DLT probability	0.007	0.017	0.043	0.10	0.22
Selection probability	0.000	0.020	0.160	0.62	0.20
Avg number of patients treated	0.180	1.240	6.280	14.24	9.06
Avg number of patients with DLT	0.000	0.040	0.260	0.98	1.92

Table 10: Performance metrics for 3+3 design when true DLT rates are p=0.003, 0.007, 0.017, 0.043, 0.10

	1	2	3	4	5
True DLT probability	0.003	0.007	0.017	0.043	0.10
Selection probability	0.000	0.020	0.000	0.260	0.72
Avg number of patients treated	0.000	0.520	2.480	8.260	19.74
Avg number of patients with DLT	0.000	0.020	0.060	0.240	1.78