

# GLIMMPSE Validation Report:

## GLMM(F) Example 1. Power for a two sample t-test for several error variance values and mean differences

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*Run Date:* 2012/12/05 12:46:46

### 1. Introduction

The following report contains validation results for the JavaStatistics library, a component of the GLIMMPSE software system. For more information about GLIMMPSE and related publications, please visit

<http://samplesizeshop.org>.

The automated validation tests shown below compare power values produced by the JavaStatistics library to published results and also to simulation. Sources for published values include POWERLIB (Johnson *et al.* 2007) and a SAS IML implementation of the methods described by Glueck and Muller (2003).

Validation results are listed in Section 3 of the report. Timing results show the calculation and simulation times for the overall experiment and the mean times per power calculation. Summary statistics show the maximum absolute deviation between the power value calculated by the JavaStatistics library and the results obtained from SAS or via simulation. The table in Section 3.3 shows the deviation values for each individual power comparison. Deviations larger than  $10^{-6}$  from SAS power values and 0.05 for simulated power values are displayed in red.

### 2. Study Design

The study design for Example 1 is a balanced, two-group design. We calculate power for a two-sample t-test comparing the mean responses between the two groups. The example is based on the results in Muller, K. E., & Benignus, V. A. (1992). *Neurotoxicology and teratology*, 14(3), 211-219.

#### 2.1. Inputs to the Power Calculation

##### 2.1.1. List Inputs

###### Type I error rates

0.0500000

###### Beta scale values

0.0000000, 0.0500000, 0.1000000, 0.1500000, 0.2000000, 0.2500000, 0.3000000, 0.3500000, 0.4000000, 0.4500000, 0.5000000, 0.5500000, 0.6000000, 0.6500000, 0.7000000, 0.7500000, 0.8000000, 0.8500000, 0.9000000, 0.9500000, 1.0000000, 1.0500000, 1.1000000, 1.1500000, 1.2000000, 1.2500000, 1.3000000, 1.3500000, 1.4000000, 1.4500000, 1.5000000, 1.5500000, 1.6000000, 1.6500000, 1.7000000, 1.7500000, 1.8000000, 1.8500000, 1.9000000, 1.9500000, 2.0000000, 2.0500000, 2.1000000, 2.1500000, 2.2000000, 2.2500000, 2.3000000, 2.3500000, 2.4000000, 2.4500000, 2.5000000

###### Sigma scale values

0.3200000, 1.0000000, 2.0500000

**Per group sample size values**

10

**Statistical tests**

UNIREP

**Power methods**

cond

*2.1.2. Matrix Inputs*

$$E_s(\mathbf{X})_{(2 \times 2)} = \begin{bmatrix} 1.0000 & 0.0000 \\ 0.0000 & 1.0000 \end{bmatrix}$$

$$\mathbf{B}_{(2 \times 1)} = \begin{bmatrix} 0.0000 \\ 2.5000 \end{bmatrix}$$

$$\mathbf{C}_{(1 \times 2)} = [1.0000 \quad -1.0000]$$

$$\mathbf{U}_{(1 \times 1)} = [1.0000]$$

$$\Theta_0_{(1 \times 1)} = [0.0000]$$

$$\Sigma_E_{(1 \times 1)} = [1.0000]$$

### 3. Validation Results

A total of 153 power values were computed for this experiment.

#### 3.1. Timing

	Total Time (seconds)	Mean Time (seconds)
Calculation	0.0620000	4.05E-4
Simulation	25.9580000	1.70E-1

#### 3.2. Summary Statistics

Max deviation from SAS	0.00000095
Max deviation from simulation	0.01030487

#### 3.3. Full Validation Results

Power	SAS Power (deviation)	Sim Power (deviation)	Test	Sigma Scale	Beta Scale	Total N	Alpha
0.0500000	0.0500000 (0.0000000)	0.0502000 (0.0002000)	UNIREP	0.3200000	0.0000000	20	0.0500000
0.0540300	0.0540296 (0.0000003)	0.0516000 (0.0024300)	UNIREP	0.3200000	0.0500000	20	0.0500000
0.0662281	0.0662279 (0.0000002)	0.0642000 (0.0020281)	UNIREP	0.3200000	0.1000000	20	0.0500000
0.0868827	0.0868826 (0.0000001)	0.0830000 (0.0038827)	UNIREP	0.3200000	0.1500000	20	0.0500000
0.1163455	0.1163455 (0.0000000)	0.1120000 (0.0043455)	UNIREP	0.3200000	0.2000000	20	0.0500000
0.1548661	0.1548658 (0.0000003)	0.1466000 (0.0082661)	UNIREP	0.3200000	0.2500000	20	0.0500000
0.2024058	0.2024057 (0.0000001)	0.1949000 (0.0075058)	UNIREP	0.3200000	0.3000000	20	0.0500000
0.2584751	0.2584745 (0.0000006)	0.2489000 (0.0095751)	UNIREP	0.3200000	0.3500000	20	0.0500000
0.3220215	0.3220213 (0.0000002)	0.3134000 (0.0086215)	UNIREP	0.3200000	0.4000000	20	0.0500000
0.3914141	0.3914133 (0.0000008)	0.3867000 (0.0047141)	UNIREP	0.3200000	0.4500000	20	0.0500000
0.4645131	0.4645128 (0.0000002)	0.4553000 (0.0092131)	UNIREP	0.3200000	0.5000000	20	0.0500000
0.5388455	0.5388455 (0.0000001)	0.5311000 (0.0077455)	UNIREP	0.3200000	0.5500000	20	0.0500000
0.6118321	0.6118319 (0.0000003)	0.6025000 (0.0093321)	UNIREP	0.3200000	0.6000000	20	0.0500000
0.6810433	0.6810432 (0.0000001)	0.6757000 (0.0053433)	UNIREP	0.3200000	0.6500000	20	0.0500000
0.7444349	0.7444347 (0.0000002)	0.7388000 (0.0056349)	UNIREP	0.3200000	0.7000000	20	0.0500000
0.8005184	0.8005178 (0.0000006)	0.7980000 (0.0025184)	UNIREP	0.3200000	0.7500000	20	0.0500000
0.8484477	0.8484475 (0.0000002)	0.8459000 (0.0025477)	UNIREP	0.3200000	0.8000000	20	0.0500000
0.8880182	0.8880177 (0.0000004)	0.8826000 (0.0054182)	UNIREP	0.3200000	0.8500000	20	0.0500000
0.9195783	0.9195782 (0.0000001)	0.9191000 (0.0004783)	UNIREP	0.3200000	0.9000000	20	0.0500000
0.9438974	0.9438972 (0.0000003)	0.9433000 (0.0005974)	UNIREP	0.3200000	0.9500000	20	0.0500000

0.9620023	0.9620018 (0.0000005)	0.9617000 (0.0003023)	UNIREP	0.3200000	1.0000000	20	0.0500000
0.9750245	0.9750244 (0.0000001)	0.9743000 (0.0007245)	UNIREP	0.3200000	1.0500000	20	0.0500000
0.9840753	0.9840751 (0.0000002)	0.9827000 (0.0013753)	UNIREP	0.3200000	1.1000000	20	0.0500000
0.9901534	0.9901531 (0.0000003)	0.9892000 (0.0009534)	UNIREP	0.3200000	1.1500000	20	0.0500000
0.9940973	0.9940972 (0.0000001)	0.9941000 (0.0000027)	UNIREP	0.3200000	1.2000000	20	0.0500000
0.9965705	0.9965704 (0.0000001)	0.9970000 (0.0004295)	UNIREP	0.3200000	1.2500000	20	0.0500000
0.9980693	0.9980691 (0.0000002)	0.9982000 (0.0001307)	UNIREP	0.3200000	1.3000000	20	0.0500000
0.9989470	0.9989468 (0.0000002)	0.9989000 (0.0000470)	UNIREP	0.3200000	1.3500000	20	0.0500000
0.9994437	0.9994435 (0.0000002)	0.9995000 (0.0000563)	UNIREP	0.3200000	1.4000000	20	0.0500000
0.9997154	0.9997152 (0.0000002)	0.9998000 (0.0000846)	UNIREP	0.3200000	1.4500000	20	0.0500000
0.9998589	0.9998589 (0.0000001)	1.0000000 (0.0001411)	UNIREP	0.3200000	1.5000000	20	0.0500000
0.9999323	0.9999323 (0.0000000)	1.0000000 (0.0000677)	UNIREP	0.3200000	1.5500000	20	0.0500000
0.9999686	0.9999685 (0.0000000)	1.0000000 (0.0000314)	UNIREP	0.3200000	1.6000000	20	0.0500000
0.9999859	0.9999859 (0.0000000)	1.0000000 (0.0000141)	UNIREP	0.3200000	1.6500000	20	0.0500000
0.9999939	0.9999938 (0.0000000)	1.0000000 (0.0000061)	UNIREP	0.3200000	1.7000000	20	0.0500000
0.9999974	0.9999974 (0.0000000)	1.0000000 (0.0000026)	UNIREP	0.3200000	1.7500000	20	0.0500000
0.9999990	0.9999989 (0.0000000)	1.0000000 (0.0000010)	UNIREP	0.3200000	1.8000000	20	0.0500000
0.9999996	0.9999996 (0.0000000)	1.0000000 (0.0000004)	UNIREP	0.3200000	1.8500000	20	0.0500000
0.9999998	0.9999998 (0.0000000)	1.0000000 (0.0000002)	UNIREP	0.3200000	1.9000000	20	0.0500000
0.9999999	0.9999999 (0.0000000)	1.0000000 (0.0000001)	UNIREP	0.3200000	1.9500000	20	0.0500000
1.0000000	1.0000000 (0.0000000)	1.0000000 (0.0000000)	UNIREP	0.3200000	2.0000000	20	0.0500000
1.0000000	1.0000000 (0.0000000)	1.0000000 (0.0000000)	UNIREP	0.3200000	2.0500000	20	0.0500000

1.0000000	1.0000000 (0.0000000)	1.0000000 (0.0000000)	UNIREP	0.3200000	2.1000000	20	0.0500000
1.0000000	1.0000000 (0.0000000)	1.0000000 (0.0000000)	UNIREP	0.3200000	2.1500000	20	0.0500000
1.0000000	1.0000000 (0.0000000)	1.0000000 (0.0000000)	UNIREP	0.3200000	2.2000000	20	0.0500000
1.0000000	1.0000000 (0.0000000)	1.0000000 (0.0000000)	UNIREP	0.3200000	2.2500000	20	0.0500000
1.0000000	1.0000000 (0.0000000)	1.0000000 (0.0000000)	UNIREP	0.3200000	2.3000000	20	0.0500000
1.0000000	1.0000000 (0.0000000)	1.0000000 (0.0000000)	UNIREP	0.3200000	2.3500000	20	0.0500000
1.0000000	1.0000000 (0.0000000)	1.0000000 (0.0000000)	UNIREP	0.3200000	2.4000000	20	0.0500000
1.0000000	1.0000000 (0.0000000)	1.0000000 (0.0000000)	UNIREP	0.3200000	2.4500000	20	0.0500000
1.0000000	1.0000000 (0.0000000)	1.0000000 (0.0000000)	UNIREP	0.3200000	2.5000000	20	0.0500000
0.0500000	0.0500000 (0.0000000)	0.0502000 (0.0002000)	UNIREP	1.0000000	0.0000000	20	0.0500000
0.0512874	0.0512874 (0.0000000)	0.0498000 (0.0014874)	UNIREP	1.0000000	0.0500000	20	0.0500000
0.0551620	0.0551613 (0.0000007)	0.0542000 (0.0009620)	UNIREP	1.0000000	0.1000000	20	0.0500000
0.0616554	0.0616554 (0.0000001)	0.0590000 (0.0026554)	UNIREP	1.0000000	0.1500000	20	0.0500000
0.0708219	0.0708213 (0.0000005)	0.0675000 (0.0033219)	UNIREP	1.0000000	0.2000000	20	0.0500000
0.0827224	0.0827224 (0.0000000)	0.0785000 (0.0042224)	UNIREP	1.0000000	0.2500000	20	0.0500000
0.0974248	0.0974246 (0.0000002)	0.0936000 (0.0038248)	UNIREP	1.0000000	0.3000000	20	0.0500000
0.1149872	0.1149872 (0.0000000)	0.1111000 (0.0038872)	UNIREP	1.0000000	0.3500000	20	0.0500000
0.1354517	0.1354516 (0.0000001)	0.1293000 (0.0061517)	UNIREP	1.0000000	0.4000000	20	0.0500000
0.1588304	0.1588300 (0.0000004)	0.1523000 (0.0065304)	UNIREP	1.0000000	0.4500000	20	0.0500000
0.1850957	0.1850957 (0.0000000)	0.1770000 (0.0080957)	UNIREP	1.0000000	0.5000000	20	0.0500000
0.2141734	0.2141732 (0.0000001)	0.2047000 (0.0094734)	UNIREP	1.0000000	0.5500000	20	0.0500000
0.2459325	0.2459321 (0.0000004)	0.2385000 (0.0074325)	UNIREP	1.0000000	0.6000000	20	0.0500000

0.2801817	0.2801817 (0.0000001)	0.2724000 (0.0077817)	UNIREP	1.0000000	0.6500000	20	0.0500000
0.3166707	0.3166705 (0.0000002)	0.3075000 (0.0091707)	UNIREP	1.0000000	0.7000000	20	0.0500000
0.3550882	0.3550879 (0.0000004)	0.3475000 (0.0075882)	UNIREP	1.0000000	0.7500000	20	0.0500000
0.3950693	0.3950692 (0.0000001)	0.3895000 (0.0055693)	UNIREP	1.0000000	0.8000000	20	0.0500000
0.4362049	0.4362047 (0.0000001)	0.4259000 (0.0103049)	UNIREP	1.0000000	0.8500000	20	0.0500000
0.4780507	0.4780504 (0.0000003)	0.4698000 (0.0082507)	UNIREP	1.0000000	0.9000000	20	0.0500000
0.5201420	0.5201414 (0.0000007)	0.5123000 (0.0078420)	UNIREP	1.0000000	0.9500000	20	0.0500000
0.5620068	0.5620066 (0.0000001)	0.5555000 (0.0065068)	UNIREP	1.0000000	1.0000000	20	0.0500000
0.6031843	0.6031841 (0.0000002)	0.5960000 (0.0071843)	UNIREP	1.0000000	1.0500000	20	0.0500000
0.6432359	0.6432355 (0.0000004)	0.6355000 (0.0077359)	UNIREP	1.0000000	1.1000000	20	0.0500000
0.6817599	0.6817598 (0.0000001)	0.6766000 (0.0051599)	UNIREP	1.0000000	1.1500000	20	0.0500000
0.7184055	0.7184054 (0.0000002)	0.7137000 (0.0047055)	UNIREP	1.0000000	1.2000000	20	0.0500000
0.7528786	0.7528784 (0.0000003)	0.7469000 (0.0059786)	UNIREP	1.0000000	1.2500000	20	0.0500000
0.7849499	0.7849495 (0.0000005)	0.7807000 (0.0042499)	UNIREP	1.0000000	1.3000000	20	0.0500000
0.8144569	0.8144568 (0.0000001)	0.8141000 (0.0003569)	UNIREP	1.0000000	1.3500000	20	0.0500000
0.8413061	0.8413059 (0.0000002)	0.8396000 (0.0017061)	UNIREP	1.0000000	1.4000000	20	0.0500000
0.8654674	0.8654672 (0.0000003)	0.8637000 (0.0017674)	UNIREP	1.0000000	1.4500000	20	0.0500000
0.8869706	0.8869702 (0.0000004)	0.8816000 (0.0053706)	UNIREP	1.0000000	1.5000000	20	0.0500000
0.9058976	0.9058969 (0.0000007)	0.9024000 (0.0034976)	UNIREP	1.0000000	1.5500000	20	0.0500000
0.9223730	0.9223728 (0.0000001)	0.9222000 (0.0001730)	UNIREP	1.0000000	1.6000000	20	0.0500000
0.9365579	0.9365577 (0.0000002)	0.9356000 (0.0009579)	UNIREP	1.0000000	1.6500000	20	0.0500000
0.9486362	0.9486359 (0.0000003)	0.9487000 (0.0000638)	UNIREP	1.0000000	1.7000000	20	0.0500000

0.9588079	0.9588075 (0.0000004)	0.9594000 (0.0005921)	UNIREP	1.0000000	1.7500000	20	0.0500000
0.9672796	0.9672795 (0.0000001)	0.9673000 (0.0000204)	UNIREP	1.0000000	1.8000000	20	0.0500000
0.9742587	0.9742585 (0.0000001)	0.9737000 (0.0005587)	UNIREP	1.0000000	1.8500000	20	0.0500000
0.9799450	0.9799448 (0.0000002)	0.9798000 (0.0001450)	UNIREP	1.0000000	1.9000000	20	0.0500000
0.9845272	0.9845269 (0.0000002)	0.9832000 (0.0013272)	UNIREP	1.0000000	1.9500000	20	0.0500000
0.9881793	0.9881790 (0.0000003)	0.9873000 (0.0008793)	UNIREP	1.0000000	2.0000000	20	0.0500000
0.9910583	0.9910579 (0.0000004)	0.9903000 (0.0007583)	UNIREP	1.0000000	2.0500000	20	0.0500000
0.9933027	0.9933026 (0.0000001)	0.9931000 (0.0002027)	UNIREP	1.0000000	2.1000000	20	0.0500000
0.9950338	0.9950337 (0.0000001)	0.9946000 (0.0004338)	UNIREP	1.0000000	2.1500000	20	0.0500000
0.9963542	0.9963540 (0.0000001)	0.9965000 (0.0001458)	UNIREP	1.0000000	2.2000000	20	0.0500000
0.9973503	0.9973502 (0.0000002)	0.9978000 (0.0004497)	UNIREP	1.0000000	2.2500000	20	0.0500000
0.9980937	0.9980935 (0.0000002)	0.9982000 (0.0001063)	UNIREP	1.0000000	2.3000000	20	0.0500000
0.9986423	0.9986422 (0.0000002)	0.9986000 (0.0000423)	UNIREP	1.0000000	2.3500000	20	0.0500000
0.9990429	0.9990427 (0.0000002)	0.9991000 (0.0000571)	UNIREP	1.0000000	2.4000000	20	0.0500000
0.9993321	0.9993319 (0.0000002)	0.9993000 (0.0000321)	UNIREP	1.0000000	2.4500000	20	0.0500000
0.9995387	0.9995385 (0.0000002)	0.9996000 (0.0000613)	UNIREP	1.0000000	2.5000000	20	0.0500000
0.0500000	0.0500000 (0.0000000)	0.0502000 (0.0002000)	UNIREP	2.0500000	0.0000000	20	0.0500000
0.0506278	0.0506278 (0.0000000)	0.0489000 (0.0017278)	UNIREP	2.0500000	0.0500000	20	0.0500000
0.0525139	0.0525138 (0.0000001)	0.0510000 (0.0015139)	UNIREP	2.0500000	0.1000000	20	0.0500000
0.0556674	0.0556665 (0.0000009)	0.0547000 (0.0009674)	UNIREP	2.0500000	0.1500000	20	0.0500000
0.0600990	0.0600990 (0.0000000)	0.0581000 (0.0019990)	UNIREP	2.0500000	0.2000000	20	0.0500000
0.0658290	0.0658288 (0.0000002)	0.0636000 (0.0022290)	UNIREP	2.0500000	0.2500000	20	0.0500000

0.0728772	0.0728765 (0.0000008)	0.0688000 (0.0040772)	UNIREP	2.0500000	0.3000000	20	0.0500000
0.0812645	0.0812645 (0.0000000)	0.0765000 (0.0047645)	UNIREP	2.0500000	0.3500000	20	0.0500000
0.0910157	0.0910156 (0.0000001)	0.0879000 (0.0031157)	UNIREP	2.0500000	0.4000000	20	0.0500000
0.1021514	0.1021511 (0.0000004)	0.0978000 (0.0043514)	UNIREP	2.0500000	0.4500000	20	0.0500000
0.1146892	0.1146892 (0.0000000)	0.1106000 (0.0040892)	UNIREP	2.0500000	0.5000000	20	0.0500000
0.1286433	0.1286432 (0.0000001)	0.1235000 (0.0051433)	UNIREP	2.0500000	0.5500000	20	0.0500000
0.1440196	0.1440194 (0.0000002)	0.1367000 (0.0073196)	UNIREP	2.0500000	0.6000000	20	0.0500000
0.1608159	0.1608155 (0.0000004)	0.1545000 (0.0063159)	UNIREP	2.0500000	0.6500000	20	0.0500000
0.1790200	0.1790190 (0.0000009)	0.1716000 (0.0074200)	UNIREP	2.0500000	0.7000000	20	0.0500000
0.1986058	0.1986057 (0.0000001)	0.1915000 (0.0071058)	UNIREP	2.0500000	0.7500000	20	0.0500000
0.2195387	0.2195385 (0.0000002)	0.2104000 (0.0091387)	UNIREP	2.0500000	0.8000000	20	0.0500000
0.2417667	0.2417664 (0.0000004)	0.2340000 (0.0077667)	UNIREP	2.0500000	0.8500000	20	0.0500000
0.2652247	0.2652239 (0.0000007)	0.2554000 (0.0098247)	UNIREP	2.0500000	0.9000000	20	0.0500000
0.2898313	0.2898312 (0.0000001)	0.2834000 (0.0064313)	UNIREP	2.0500000	0.9500000	20	0.0500000
0.3154940	0.3154939 (0.0000001)	0.3062000 (0.0092940)	UNIREP	2.0500000	1.0000000	20	0.0500000
0.3421039	0.3421036 (0.0000003)	0.3345000 (0.0076039)	UNIREP	2.0500000	1.0500000	20	0.0500000
0.3695396	0.3695391 (0.0000005)	0.3656000 (0.0039396)	UNIREP	2.0500000	1.1000000	20	0.0500000
0.3976677	0.3976677 (0.0000001)	0.3922000 (0.0054677)	UNIREP	2.0500000	1.1500000	20	0.0500000
0.4263467	0.4263466 (0.0000001)	0.4169000 (0.0094467)	UNIREP	2.0500000	1.2000000	20	0.0500000
0.4554252	0.4554250 (0.0000002)	0.4460000 (0.0094252)	UNIREP	2.0500000	1.2500000	20	0.0500000
0.4847469	0.4847465 (0.0000003)	0.4765000 (0.0082469)	UNIREP	2.0500000	1.3000000	20	0.0500000
0.5141518	0.5141513 (0.0000006)	0.5053000 (0.0088518)	UNIREP	2.0500000	1.3500000	20	0.0500000



0.5434784	0.5434783 (0.0000001)	0.5356000 (0.0078784)	UNIREP	2.0500000	1.4000000	20	0.0500000
0.5725687	0.5725686 (0.0000001)	0.5667000 (0.0058687)	UNIREP	2.0500000	1.4500000	20	0.0500000
0.6012672	0.6012670 (0.0000002)	0.5947000 (0.0065672)	UNIREP	2.0500000	1.5000000	20	0.0500000
0.6294253	0.6294250 (0.0000004)	0.6213000 (0.0081253)	UNIREP	2.0500000	1.5500000	20	0.0500000
0.6569034	0.6569029 (0.0000006)	0.6506000 (0.0063034)	UNIREP	2.0500000	1.6000000	20	0.0500000
0.6835719	0.6835718 (0.0000001)	0.6782000 (0.0053719)	UNIREP	2.0500000	1.6500000	20	0.0500000
0.7093156	0.7093155 (0.0000001)	0.7042000 (0.0051156)	UNIREP	2.0500000	1.7000000	20	0.0500000
0.7340316	0.7340314 (0.0000002)	0.7281000 (0.0059316)	UNIREP	2.0500000	1.7500000	20	0.0500000
0.7576327	0.7576324 (0.0000003)	0.7517000 (0.0059327)	UNIREP	2.0500000	1.8000000	20	0.0500000
0.7800474	0.7800469 (0.0000004)	0.7752000 (0.0048474)	UNIREP	2.0500000	1.8500000	20	0.0500000
0.8012204	0.8012197 (0.0000006)	0.7987000 (0.0025204)	UNIREP	2.0500000	1.9000000	20	0.0500000
0.8211117	0.8211116 (0.0000001)	0.8214000 (0.0002883)	UNIREP	2.0500000	1.9500000	20	0.0500000
0.8396994	0.8396992 (0.0000002)	0.8380000 (0.0016994)	UNIREP	2.0500000	2.0000000	20	0.0500000
0.8569746	0.8569744 (0.0000002)	0.8552000 (0.0017746)	UNIREP	2.0500000	2.0500000	20	0.0500000
0.8729437	0.8729434 (0.0000003)	0.8694000 (0.0035437)	UNIREP	2.0500000	2.1000000	20	0.0500000
0.8876257	0.8876253 (0.0000004)	0.8822000 (0.0054257)	UNIREP	2.0500000	2.1500000	20	0.0500000
0.9010519	0.9010513 (0.0000006)	0.8973000 (0.0037519)	UNIREP	2.0500000	2.2000000	20	0.0500000
0.9132628	0.9132627 (0.0000001)	0.9121000 (0.0011628)	UNIREP	2.0500000	2.2500000	20	0.0500000
0.9243097	0.9243096 (0.0000002)	0.9237000 (0.0006097)	UNIREP	2.0500000	2.3000000	20	0.0500000
0.9342495	0.9342493 (0.0000002)	0.9332000 (0.0010495)	UNIREP	2.0500000	2.3500000	20	0.0500000
0.9431451	0.9431448 (0.0000003)	0.9420000 (0.0011451)	UNIREP	2.0500000	2.4000000	20	0.0500000
0.9510633	0.9510630 (0.0000003)	0.9512000 (0.0001367)	UNIREP	2.0500000	2.4500000	20	0.0500000

0.9580738	0.9580733 (0.0000004)	0.9589000 (0.0008262)	UNIREP	2.0500000	2.5000000	20	0.0500000
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## References

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