

| | A | B | C | D | E | F | G | H | I |
|----|--|---------------------|-----------------------|--|---------|----------------------|------------------|--------------------|---|
| 1 | $\int_0^1 \int_0^1 F(x,y) \cdot dx \cdot dy$ | | $F(x,y) = e^{-(x+y)}$ | $\int_0^1 \int_0^1 e^{-(x+y)} \cdot dx \cdot dy = e^{-2} - 2 \cdot e^{-1} + 1 = 0.3995\dots$ | | | | | |
| 3 | MONTE CARLO | | | | | | Exact | =EXP(-2)*EXP(-1)+1 | |
| 4 | PSEUDO RANDO | | | | | | | | |
| 5 | | | | Quasi MC: | | Pseudo MC: | | | |
| 6 | | vector samples: 100 | | =AVERAGE(D15:D115) | | =AVERAGE(H15:H115) | | | |
| 7 | | | Relative Error | =ABS(G3-D6)/G3 | | =ABS(G3-F6)/G3 | | | |
| 8 | | | | | | | | | |
| 9 | | | | Quasi MC: | | Pseudo MC: | | | |
| 10 | | vector samples: 500 | | =AVERAGE(D15:D515) | | =AVERAGE(H15:H515) | | | |
| 11 | | | Relative Error | =ABS(G3-D10)/G3 | | =ABS(G3-F10)/G3 | | | |
| 12 | | | | | | | | | |
| 13 | | QUASI RANDOM VECTOR | | | | PSEUDO RANDOM NUMBER | | | |
| 14 | vector# | x | y | F(x,y) | x | y | F(x,y) | | |
| 15 | 1 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B15+C15)) | =RAND() | =RAND() | =EXP(-(F15+G15)) | | |
| 16 | 2 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B16+C16)) | =RAND() | =RAND() | =EXP(-(F16+G16)) | | |
| 17 | 3 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B17+C17)) | =RAND() | =RAND() | =EXP(-(F17+G17)) | | |
| 18 | 4 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B18+C18)) | =RAND() | =RAND() | =EXP(-(F18+G18)) | | |
| 19 | 5 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B19+C19)) | =RAND() | =RAND() | =EXP(-(F19+G19)) | | |
| 20 | 6 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B20+C20)) | =RAND() | =RAND() | =EXP(-(F20+G20)) | | |
| 21 | 7 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B21+C21)) | =RAND() | =RAND() | =EXP(-(F21+G21)) | | |
| 22 | 8 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B22+C22)) | =RAND() | =RAND() | =EXP(-(F22+G22)) | | |
| 23 | 9 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B23+C23)) | =RAND() | =RAND() | =EXP(-(F23+G23)) | | |
| 24 | 10 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B24+C24)) | =RAND() | =RAND() | =EXP(-(F24+G24)) | | |
| 25 | 11 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B25+C25)) | =RAND() | =RAND() | =EXP(-(F25+G25)) | | |
| 26 | 12 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B26+C26)) | =RAND() | =RAND() | =EXP(-(F26+G26)) | | |
| 27 | 13 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B27+C27)) | =RAND() | =RAND() | =EXP(-(F27+G27)) | | |
| 28 | 14 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B28+C28)) | =RAND() | =RAND() | =EXP(-(F28+G28)) | | |
| 29 | 15 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B29+C29)) | =RAND() | =RAND() | =EXP(-(F29+G29)) | | |
| 30 | 16 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B30+C30)) | =RAND() | =RAND() | =EXP(-(F30+G30)) | | |
| 31 | 17 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B31+C31)) | =RAND() | =RAND() | =EXP(-(F31+G31)) | | |
| 32 | 18 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B32+C32)) | =RAND() | =RAND() | =EXP(-(F32+G32)) | | |
| 33 | 19 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B33+C33)) | =RAND() | =RAND() | =EXP(-(F33+G33)) | | |
| 34 | 20 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B34+C34)) | =RAND() | =RAND() | =EXP(-(F34+G34)) | | |
| 35 | 21 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B35+C35)) | =RAND() | =RAND() | =EXP(-(F35+G35)) | | |
| 36 | 22 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B36+C36)) | =RAND() | =RAND() | =EXP(-(F36+G36)) | | |
| 37 | 23 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B37+C37)) | =RAND() | =RAND() | =EXP(-(F37+G37)) | | |
| 38 | 24 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B38+C38)) | =RAND() | =RAND() | =EXP(-(F38+G38)) | | |
| 39 | 25 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B39+C39)) | =RAND() | =RAND() | =EXP(-(F39+G39)) | | |
| 40 | 26 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B40+C40)) | =RAND() | =RAND() | =EXP(-(F40+G40)) | | |
| 41 | 27 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B41+C41)) | =RAND() | =RAND() | =EXP(-(F41+G41)) | | |
| 42 | 28 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B42+C42)) | =RAND() | =RAND() | =EXP(-(F42+G42)) | | |
| 43 | 29 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B43+C43)) | =RAND() | =RAND() | =EXP(-(F43+G43)) | | |
| 44 | 30 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B44+C44)) | =RAND() | =RAND() | =EXP(-(F44+G44)) | | |
| 45 | 31 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B45+C45)) | =RAND() | =RAND() | =EXP(-(F45+G45)) | | |
| 46 | 32 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B46+C46)) | =RAND() | =RAND() | =EXP(-(F46+G46)) | | |
| 47 | 33 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B47+C47)) | =RAND() | =RAND() | =EXP(-(F47+G47)) | | |
| 48 | 34 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B48+C48)) | =RAND() | =RAND() | =EXP(-(F48+G48)) | | |
| 49 | 35 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B49+C49)) | =RAND() | =RAND() | =EXP(-(F49+G49)) | | |
| 50 | 36 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B50+C50)) | =RAND() | =RAND() | =EXP(-(F50+G50)) | | |
| 51 | 37 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B51+C51)) | =RAND() | =RAND() | =EXP(-(F51+G51)) | | |
| 52 | 38 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B52+C52)) | =RAND() | =RAND() | =EXP(-(F52+G52)) | | |
| 53 | 39 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B53+C53)) | =RAND() | =RAND() | =EXP(-(F53+G53)) | | |
| 54 | 40 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B54+C54)) | =RAND() | =RAND() | =EXP(-(F54+G54)) | | |
| 55 | 41 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B55+C55)) | =RAND() | =RAND() | =EXP(-(F55+G55)) | | |
| 56 | 42 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B56+C56)) | =RAND() | =RAND() | =EXP(-(F56+G56)) | | |
| 57 | 43 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B57+C57)) | =RAND() | =RAND() | =EXP(-(F57+G57)) | | |
| 58 | 44 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B58+C58)) | =RAND() | =RAND() | =EXP(-(F58+G58)) | | |
| 59 | 45 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B59+C59)) | =RAND() | =RAND() | =EXP(-(F59+G59)) | | |
| 60 | 46 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B60+C60)) | =RAND() | =RAND() | =EXP(-(F60+G60)) | | |
| 61 | 47 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B61+C61)) | =RAND() | =RAND() | =EXP(-(F61+G61)) | | |
| 62 | 48 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B62+C62)) | =RAND() | =RAND() | =EXP(-(F62+G62)) | | |
| 63 | 49 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B63+C63)) | =RAND() | =RAND() | =EXP(-(F63+G63)) | | |
| 64 | 50 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B64+C64)) | =RAND() | =RAND() | =EXP(-(F64+G64)) | | |
| 65 | 51 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B65+C65)) | =RAND() | =RAND() | =EXP(-(F65+G65)) | | |
| 66 | 52 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B66+C66)) | =RAND() | =RAND() | =EXP(-(F66+G66)) | | |
| 67 | 53 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B67+C67)) | =RAND() | =RAND() | =EXP(-(F67+G67)) | | |
| 68 | 54 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B68+C68)) | =RAND() | =RAND() | =EXP(-(F68+G68)) | | |
| 69 | 55 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B69+C69)) | =RAND() | =RAND() | =EXP(-(F69+G69)) | | |
| 70 | 56 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B70+C70)) | =RAND() | =RAND() | =EXP(-(F70+G70)) | | |
| 71 | 57 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B71+C71)) | =RAND() | =RAND() | =EXP(-(F71+G71)) | | |
| 72 | 58 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B72+C72)) | =RAND() | =RAND() | =EXP(-(F72+G72)) | | |
| 73 | 59 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B73+C73)) | =RAND() | =RAND() | =EXP(-(F73+G73)) | | |
| 74 | 60 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B74+C74)) | =RAND() | =RAND() | =EXP(-(F74+G74)) | | |
| 75 | 61 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B75+C75)) | =RAND() | =RAND() | =EXP(-(F75+G75)) | | |
| 76 | 62 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B76+C76)) | =RAND() | =RAND() | =EXP(-(F76+G76)) | | |
| 77 | 63 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B77+C77)) | =RAND() | =RAND() | =EXP(-(F77+G77)) | | |
| 78 | 64 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B78+C78)) | =RAND() | =RAND() | =EXP(-(F78+G78)) | | |
| 79 | 65 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B79+C79)) | =RAND() | =RAND() | =EXP(-(F79+G79)) | | |
| 80 | 66 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B80+C80)) | =RAND() | =RAND() | =EXP(-(F80+G80)) | | |
| 81 | 67 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B81+C81)) | =RAND() | =RAND() | =EXP(-(F81+G81)) | | |
| 82 | 68 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B82+C82)) | =RAND() | =RAND() | =EXP(-(F82+G82)) | | |
| 83 | 69 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B83+C83)) | =RAND() | =RAND() | =EXP(-(F83+G83)) | | |
| 84 | 70 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B84+C84)) | =RAND() | =RAND() | =EXP(-(F84+G84)) | | |
| 85 | 71 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B85+C85)) | =RAND() | =RAND() | =EXP(-(F85+G85)) | | |
| 86 | 72 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B86+C86)) | =RAND() | =RAND() | =EXP(-(F86+G86)) | | |
| 87 | 73 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B87+C87)) | =RAND() | =RAND() | =EXP(-(F87+G87)) | | |
| 88 | 74 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B88+C88)) | =RAND() | =RAND() | =EXP(-(F88+G88)) | | |
| 89 | 75 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B89+C89)) | =RAND() | =RAND() | =EXP(-(F89+G89)) | | |
| 90 | 76 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B90+C90)) | =RAND() | =RAND() | =EXP(-(F90+G90)) | | |
| 91 | 77 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B91+C91)) | =RAND() | =RAND() | =EXP(-(F91+G91)) | | |
| 92 | 78 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B92+C92)) | =RAND() | =RAND() | =EXP(-(F92+G92)) | | |
| 93 | 79 | =RRAND(1,2) | =RRAND(1,2) | =EXP(-(B93+C93)) | =RAND() | =RAND() | =EXP(-(F93+G93)) | | |

| | A | B | C | D | E | F | G | H | I |
|-----|-----|-------------|-------------|--------------------|---------|---------|---------|--------------------|---|
| 94 | 80 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B94+C94)) | =RAND() | =RAND() | =RAND() | =EXP(-(F94+G94)) | |
| 95 | 81 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B95+C95)) | =RAND() | =RAND() | =RAND() | =EXP(-(F95+G95)) | |
| 96 | 82 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B96+C96)) | =RAND() | =RAND() | =RAND() | =EXP(-(F96+G96)) | |
| 97 | 83 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B97+C97)) | =RAND() | =RAND() | =RAND() | =EXP(-(F97+G97)) | |
| 98 | 84 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B98+C98)) | =RAND() | =RAND() | =RAND() | =EXP(-(F98+G98)) | |
| 99 | 85 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B99+C99)) | =RAND() | =RAND() | =RAND() | =EXP(-(F99+G99)) | |
| 100 | 86 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B100+C100)) | =RAND() | =RAND() | =RAND() | =EXP(-(F100+G100)) | |
| 101 | 87 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B101+C101)) | =RAND() | =RAND() | =RAND() | =EXP(-(F101+G101)) | |
| 102 | 88 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B102+C102)) | =RAND() | =RAND() | =RAND() | =EXP(-(F102+G102)) | |
| 103 | 89 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B103+C103)) | =RAND() | =RAND() | =RAND() | =EXP(-(F103+G103)) | |
| 104 | 90 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B104+C104)) | =RAND() | =RAND() | =RAND() | =EXP(-(F104+G104)) | |
| 105 | 91 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B105+C105)) | =RAND() | =RAND() | =RAND() | =EXP(-(F105+G105)) | |
| 106 | 92 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B106+C106)) | =RAND() | =RAND() | =RAND() | =EXP(-(F106+G106)) | |
| 107 | 93 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B107+C107)) | =RAND() | =RAND() | =RAND() | =EXP(-(F107+G107)) | |
| 108 | 94 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B108+C108)) | =RAND() | =RAND() | =RAND() | =EXP(-(F108+G108)) | |
| 109 | 95 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B109+C109)) | =RAND() | =RAND() | =RAND() | =EXP(-(F109+G109)) | |
| 110 | 96 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B110+C110)) | =RAND() | =RAND() | =RAND() | =EXP(-(F110+G110)) | |
| 111 | 97 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B111+C111)) | =RAND() | =RAND() | =RAND() | =EXP(-(F111+G111)) | |
| 112 | 98 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B112+C112)) | =RAND() | =RAND() | =RAND() | =EXP(-(F112+G112)) | |
| 113 | 99 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B113+C113)) | =RAND() | =RAND() | =RAND() | =EXP(-(F113+G113)) | |
| 114 | 100 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B114+C114)) | =RAND() | =RAND() | =RAND() | =EXP(-(F114+G114)) | |
| 115 | 101 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B115+C115)) | =RAND() | =RAND() | =RAND() | =EXP(-(F115+G115)) | |
| 116 | 102 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B116+C116)) | =RAND() | =RAND() | =RAND() | =EXP(-(F116+G116)) | |
| 117 | 103 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B117+C117)) | =RAND() | =RAND() | =RAND() | =EXP(-(F117+G117)) | |
| 118 | 104 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B118+C118)) | =RAND() | =RAND() | =RAND() | =EXP(-(F118+G118)) | |
| 119 | 105 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B119+C119)) | =RAND() | =RAND() | =RAND() | =EXP(-(F119+G119)) | |
| 120 | 106 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B120+C120)) | =RAND() | =RAND() | =RAND() | =EXP(-(F120+G120)) | |
| 121 | 107 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B121+C121)) | =RAND() | =RAND() | =RAND() | =EXP(-(F121+G121)) | |
| 122 | 108 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B122+C122)) | =RAND() | =RAND() | =RAND() | =EXP(-(F122+G122)) | |
| 123 | 109 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B123+C123)) | =RAND() | =RAND() | =RAND() | =EXP(-(F123+G123)) | |
| 124 | 110 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B124+C124)) | =RAND() | =RAND() | =RAND() | =EXP(-(F124+G124)) | |
| 125 | 111 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B125+C125)) | =RAND() | =RAND() | =RAND() | =EXP(-(F125+G125)) | |
| 126 | 112 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B126+C126)) | =RAND() | =RAND() | =RAND() | =EXP(-(F126+G126)) | |
| 127 | 113 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B127+C127)) | =RAND() | =RAND() | =RAND() | =EXP(-(F127+G127)) | |
| 128 | 114 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B128+C128)) | =RAND() | =RAND() | =RAND() | =EXP(-(F128+G128)) | |
| 129 | 115 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B129+C129)) | =RAND() | =RAND() | =RAND() | =EXP(-(F129+G129)) | |
| 130 | 116 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B130+C130)) | =RAND() | =RAND() | =RAND() | =EXP(-(F130+G130)) | |
| 131 | 117 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B131+C131)) | =RAND() | =RAND() | =RAND() | =EXP(-(F131+G131)) | |
| 132 | 118 | =rrand(1,2) | =rrand(1,2) | =EXP(-(B132+C132)) | =RAND() | =RAND() | =RAND() | =EXP(-(F132+G132)) | |