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Lab 5

2/11/15

7. Explain how adding the constant C to every data item in steps 4-6 should affect the sample variance in theory. Describe what you observed in practice for the two formulas.

Adding the constant C to every data item increased the size of the numbers that my calculations had to handle. The numbers became too large during the calculations for the one-pass variance. I encountered the cancellation error of subtracting 2 very large numbers. Therefore the one-pass variance calculations for larger C is wrong. However, the 2-pass variance calculations are still correct. Theoretically, adding to the constant C should not affect the variances. This is true for what happened in the 2-pass variance calculations.

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rlaw001@bass $ csim
C = 0
Mean: 0.502515 StdDev: 0.288379 Var2: 0.0831625 Var1: 0.0831625 95%CI: [0.495992, 0.509039]
Mean: 0.501865 StdDev: 0.288568 Var2: 0.0832715 Var1: 0.0832715 95%CI: [0.495337, 0.508392]
Mean: 0.4953 StdDev: 0.287861 Var2: 0.0828638 Var1: 0.0828638 95%CI: [0.488789, 0.501812]
Mean: 0.500286 StdDev: 0.288103 Var2: 0.0830034 Var1: 0.0830034 95%CI: [0.493769, 0.506803]
Mean: 0.505487 StdDev: 0.288507 Var2: 0.0832366 Var1: 0.0832366 95%CI: [0.498961, 0.512013]
Mean: 0.502572 StdDev: 0.28945 Var2: 0.0837814 Var1: 0.0837814 95%CI: [0.496025, 0.50912]
Mean: 0.504115 StdDev: 0.288683 Var2: 0.0833377 Var1: 0.0833377 95%CI: [0.497585, 0.510645]
Mean: 0.498691 StdDev: 0.289284 Var2: 0.0836852 Var1: 0.0836852 95%CI: [0.492147, 0.505234]
Mean: 0.500977 StdDev: 0.28818 Var2: 0.0830478 Var1: 0.0830478 95%CI: [0.494459, 0.507496]
Mean: 0.503757 StdDev: 0.28878 Var2: 0.0833939 Var1: 0.0833939 95%CI: [0.497225, 0.510289]
C = 10000
Mean: 10000.5 StdDev: 0.289428 Var2: 0.0837644 Var1: 0.0837687 95%CI: [10000.5, 10000.5]
Mean: 10000.5 StdDev: 0.291134 Var2: 0.084755 Var1: 0.0847593 95%CI: [10000.5, 10000.5]
Mean: 10000.5 StdDev: 0.28726 Var2: 0.0825142 Var1: 0.0825185 95%CI: [10000.5, 10000.5]
Mean: 10000.5 StdDev: 0.289475 Var2: 0.0837911 Var1: 0.0837959 95%CI: [10000.5, 10000.5]
Mean: 10000.5 StdDev: 0.288247 Var2: 0.0830818 Var1: 0.0830864 95%CI: [10000.5, 10000.5]
Mean: 10000.5 StdDev: 0.287806 Var2: 0.0828275 Var1: 0.0828323 95%CI: [10000.5, 10000.5]
Mean: 10000.5 StdDev: 0.288162 Var2: 0.0830326 Var1: 0.0830371 95%CI: [10000.5, 10000.5]
Mean: 10000.5 StdDev: 0.289526 Var2: 0.0838213 Var1: 0.0838252 95%CI: [10000.5, 10000.5]
Mean: 10000.5 StdDev: 0.288215 Var2: 0.0830631 Var1: 0.0830676 95%CI: [10000.5, 10000.5]
Mean: 10000.5 StdDev: 0.287826 Var2: 0.0828398 Var1: 0.0828439 95%CI: [10000.5, 10000.5]
C = 10000000
Mean: 1e+07 StdDev: nan Var2: 0.0834293 Var1: -1.19953 95%CI: [nan, nan]
Mean: 1e+07 StdDev: 1.22067 Var2: 0.0826574 Var1: 1.49002 95%CI: [1e+07, 1e+07]
Mean: 1e+07 StdDev: 0.910097 Var2: 0.0836412 Var1: 0.828277 95%CI: [1e+07, 1e+07]
Mean: 1e+07 StdDev: 0.564575 Var2: 0.0849121 Var1: 0.318744 95%CI: [1e+07, 1e+07]
Mean: 1e+07 StdDev: nan Var2: 0.0838693 Var1: -0.799874 95%CI: [nan, nan]
Mean: 1e+07 StdDev: nan Var2: 0.0826112 Var1: -0.297749 95%CI: [nan, nan]
Mean: 1e+07 StdDev: nan Var2: 0.0823221 Var1: -0.055168 95%CI: [nan, nan]
Mean: 1e+07 StdDev: 1.05409 Var2: 0.0822157 Var1: 1.1111 95%CI: [1e+07, 1e+07]
Mean: 1e+07 StdDev: 0.397488 Var2: 0.0847877 Var1: 0.157997 95%CI: [1e+07, 1e+07]
Mean: 1e+07 StdDev: 0.484966 Var2: 0.0824616 Var1: 0.235192 95%CI: [1e+07, 1e+07]
C = 1000000000
Mean: 1e+09 StdDev: nan Var2: 0.0836511 Var1: -11644.7 95%CI: [nan, nan]
Mean: 1e+09 StdDev: nan Var2: 0.0839538 Var1: -4215.92 95%CI: [nan, nan]
Mean: 1e+09 StdDev: 71.9695 Var2: 0.0832354 Var1: 5179.6 95%CI: [1e+09, 1e+09]
Mean: 1e+09 StdDev: 72.1393 Var2: 0.0837526 Var1: 5204.08 95%CI: [1e+09, 1e+09]
Mean: 1e+09 StdDev: nan Var2: 0.0829019 Var1: -1159.9 95%CI: [nan, nan]
Mean: 1e+09 StdDev: nan Var2: 0.0837547 Var1: -6162.13 95%CI: [nan, nan]
Mean: 1e+09 StdDev: 68.8949 Var2: 0.0817194 Var1: 4746.51 95%CI: [1e+09, 1e+09]
Mean: 1e+09 StdDev: nan Var2: 0.0838462 Var1: -2199.87 95%CI: [nan, nan]
Mean: 1e+09 StdDev: nan Var2: 0.0835881 Var1: 2490.82 95%CI: [nan, nan]
Mean: 1e+09 StdDev: 81.7758 Var2: 0.0830322 Var1: 6687.29 95%CI: [1e+09, 1e+09]
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