**Random walk code**

When plotted, the four random walk function gives the following graph:

Series 1’s walk finishes at distance x = -14 units; x2= 196

Series 2’s walk finishes at distance x = -6 units; x2= 36

Series 3’s walk finishes at distance x = -10 units; x2= 100

Series 4’s walk finishes at distance x = 4 units; x2= 16

XRMS = √ (196+36+100+16)/2 =9.32 ≈ 10 = √N (where N = 100 here since 100 steps are taken in each simulation), so it is quite consistent with the expected value.

1 million random walk histogram

As one can observe from the graph above, the odd displacements’ bins are 0 (i.e. the gaps in the diagram above.)

The theoretical count is generated by the formula

Binom.dist(x,100,0.5,FALSE),

The expression above means

Probability of having x successes in 100 independent trials, where for each trial, the probability of success is 0.5. (False means non-cumulative probability.)

In this context,

x= number of steps forward, Displacement=2x-100 (as denoted in line 50 of the code)

x= 100+displacement/2.

(All odd number displacements are not plotted as it will give half-integer x, which does not make sense; moreover it has been explained that odd numbered bins are supposed to have 0 counts.)