

Expected Value and SE Practice: Chapter 17

1. True or False? In order to get accurate probabilities for the sum of the draws when a large number of tickets is chosen at random with replacement from a box, it is necessary to assume a normal curve for the box.
2. The heights of a group of 100,000 women average 65.4 inches with an SD of 2.4 inches. *Do not* assume that these heights followed the normal curve.
 - (a) A single woman chosen at random is expected to be how tall?
Will she be exactly that tall? If not, about how far off will her actual height be from that expected height?
 - (b) Now 50 women are chosen at random and asked to lie on the ground in a line, tight together head to head and foot to foot (in alternating directions).
 - i. About how long should that line be? What's the give or take?
 - ii. Find the chance (to the nearest 1%) that the line will be longer than 270 feet.
3. A box contains one half-dollar, one quarter, one dime, two nickels, and five pennies. A player draws 200 times with replacement. The player wins the coin drawn, and another coin of the same denomination is put into the box before the next draw, restoring the box to its original composition.

Find the chance that the total won on the 200 draws is between \$12 and \$22.

4. A fair die is rolled 840 times.
The player will keep track of the number of times that the face with four spots comes up.
 - (a) Will the box used for the model follow the normal curve?
 - (b) If possible, find the probability to the nearest 1% that the face with four spots comes up at least 130 times in the 840 rolls.
5. Eighty draws are going to be made at random with replacement from the box

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- (a) Find the expected value and standard error for the sum.
- (b) The sum of the draws will be around _____, give or take _____ or so.
- (c) Find the approximate chance that the sum of the draws will be positive.
- (d) Find the approximate chance that there will be at least 73

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Answers:

1. False.
2. (a) 65.4 inches.
No. She will be off from 65.4 inches by about 2.4 inches.
(b) i. 272 feet, six inches or 272.5 feet.
The give or take is 16.97056 inches or 1.41421356 feet.
ii. 96%.
3. About 75%.
4. (a) No.
For the original box, there are six tickets numbered 1 to 6, with one of each. That's not at all like the normal curve.
For the new zero-one counting box for the qualitative data after classification, there will be five 0's and one 1. Again: no normal curve.
(b) An approximation is possible because the sum of the draws will follow the normal curve, and—with a large number of rolls—it will be a very good approximation.
The probability is about 83% (more exactly, about 82.895%).
5. (a) 48 and 25.044.
(b) 48, 25.044.
(c) About 97%.
(d) About 1%.