Session 3 Written Assignments

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# How can a civilization discover the normal distribution? what is the mechanism in nature / life / world that produces the normal distribution?

The key to phenomena that produce a normal distribution is perhaps in the central limit theorem, which proves mathematically that a series averages drawn from any one probability distribution will themselves have a normal distribution. So any mechanism in the world that is influenced by a series of averages is likely to have a normal distribution.

NOTE: I’m not entirely happy with this answer. Also, Wikipedia states that there are some natural phenomena in physics that are perfectly normal, and that approximate normal involves additive effects, but when multiplicative effects are involved normal distributions are usually not the result.

# Calculate the expected value of a die where each number is likely to come up with a probability proportional to its value. So 2 is likely to appear twice as many times as 1, and 6 is likely to appear 6 times as frequently as 1.

First we have to solve the problem

p + 2p + 3p +4p +5p +6p = 1

Which gives p = 1/21

Now we can calculate the expected value of interest with the proper weights:

(1/21)\*1+(2/21)\*2+(3/21)\*3+(4/21)\*4+(5/21)\*5+(6/21)\*6=4.33