

Exercise 12

- a) Suppose you throw three dices and calculates the sum. Draw the probability density function for these results.

Tip:

The probability of one specific result is $(1/6)^3 = 0.004696$. To find the probabilities of the different sums it can be helpful to observe the following: There is only one combination of xxx (the same number on all dices). There are 3 combinations of xyx (xyx , xyx , xyx) and there are 6 combinations of xyz (xyz , xzy , zxy , yxz , yzx , zyx). As an example, the sum 5 can be a result of $1+1+3$ or $1+2+2$ i.e. $xyx+xyx$ which give $3+3=6$ combinations and a total probability of $6 \cdot (1/6)^3$.

- b) Suppose you repeat the dice throwing 2000 times. Draw the expected histogram of the results.
- c) A signal has average value 1V and standard deviation 0.9V in normal distribution. If you take one measurement of this signal, what is the probability that this sample will have a value less than 0.1V?
- d) Take the average of 4 measurements of the signal in c), what is the probability that this average will have a value less than 0.1V?
- e) Suppose you take a 128 samples DFT of a noisy signal to find its power spectrum. How many dB would the noise floor decrease if you took a 1024 samples DFT instead?