

Question set 1

1. Use R to toss 1000 times a biased coin with probability of head 0.7 and make a line chart of the running relative frequencies of heads againsts number of tosses. Repeat the entire experiment once more (i.e., toss the same coin 1000 more times) and overlay the new line on top of the old chart. Both the lines should be completely visible (not get out of the screen). Use different colours for the two lines.

Hint: You may look up the help of the `sample` function to learn how to simulate from a biased coin.

2. Suppose we take two coins (one with probability of head 0.3, and the other with probability of head 0.6) and toss them alternately. How would the relative frequencies of heads behave? First argue theoretically. Then check by simulating the tosses in R.
3. Repeat the audio recording example done in class. Once in a silent room, then once again while you are shouting in front of the microphone. How do the histograms differ?
4. This exercise is to give you an idea about why we prefer to use relative frequency *density* instead of just relative frequency while making a histogram. Generate 1000 random numbers from $Unif(0, 2)$ distribution (i.e., a distribution that can output any value in $(0, 2)$ with each value being equally likely). Draw a histogram with a single bin $[0, 2]$ and then compare it with the histogram with bins $[0, 1)$, $[1, 2]$. First compare using relative frequency, and then using relative frequency density.

Hint: `runif(1000,min=0,max=2)` will generate the numbers.