

Set #1

Due Date Friday September 10, 2021

Make note of the following:

- Problems will be worked on the white board during class time and turned in final in paper form by the due date
- Write only on one side of the paper
- Please try if possible to start each new problem on a clean sheet of paper
- Use engineering paper if you like

Problems

1. Z&T 6.5.
2. Z&T 6.9. Change the problem statement for $X = 1$ to be when exactly two heads appear. In this problem consider the view of each experiment generating a random 3-bit word, with '1' a *head* and '0' a *tail*. Ask yourself questions like how many unique 3-bit words are there and which ones correspond to $X = 1$?
3. Z&T 6.10.
4. Z&T 6.23.
5. Z&T 6.34.
6. Z&T 6.38. Also compare with the Q -function approximation given by Example 3.4 of the notes. On your loglog plot make the x-axis range from 10^{-2} to 10^1 and the y-axis range from 10^{-9} to 10^0 . Suppose you are plotting $f(x)$ versus x , consider in Python with numpy and matplotlib:
`x = logspace(log10(0.01),log10(10),400)`
`loglog(x,f1(x))`
 To get access to `erfc()` in Python you can use `scipy.special` or `scipy.stats`:
`import scipy.special as special`
`import scipy.stats as stats`
 To use `special.erfc()` or `stats.norm.sf()`. Note `norm.sf()` is the survival function which is equivalent to $Q(x)$. See <https://docs.scipy.org/doc/scipy/reference/generated/scipy.stats.norm.html>.
7. Z&T 6.44.