Risk analysis lab 2019. 10. 29. (Sampling methods)

1. Write a function to calculate the Li-Sylvester bounds:

$$\sum_{k=1}^{K} p(\boldsymbol{y}_k) \leq E(p(\boldsymbol{y})) \leq \sum_{k=1}^{K} p(\boldsymbol{y}_k) + P(Y_2) = \sum_{k=1}^{K} p(\boldsymbol{y}_k) + \sum_{k=K+1}^{2^N} p(\boldsymbol{y}_k)$$

Consider the first *K* most probable vectors for analytical calculation):

$$p(\boldsymbol{y}_1) \geq \ldots \geq p(\boldsymbol{y}_K) \geq \ldots \geq p(\boldsymbol{y}_{2^N})$$

where the probabilities can be calculated as:

$$p(\boldsymbol{y}) = \prod_{i=1}^{N} p^{y_i}(1-p)^{(1-y_i)}$$

e.g.:

```
def calcLiSylvester(p, N, K):
   …
   return (lower_b, upper_b)
```

3 points

2. Compare Li-Sylvester bounds to the previous methods used to estimating risk (CLT, Markov, Chernoff) by generating examples (***h*** and ***p*** vectors and *C*) and plot the results.

2 points