

Problem 1

According to some analyses, the control of the Senate in the 2014 elections hinged on the races in 3 states: Arkansas, Louisiana and North Carolina, where 3 Democratic incumbents faced very competitive opponents. The day before the election, poll aggregators estimated that the Republicans had the following chances of winning each of these races: Arkansas 67%, Louisiana 61% and North Carolina 52%.

To win control of the senate, Republicans would have needed to win at least two of these races. Give an estimate the probability of the Republicans taking control of the senate, assuming the outcomes in each state are independent.

Problem 2

Imagine that you've graduated with your BBA and taken a spectacular job that involves significant travel. You'll be traveling routinely to Boston and Los Angeles. You're trying to decide whether you want to fly American or Delta, so you can start accumulating miles and status, and you also want to minimize the time you spend sitting in airports or missing connecting flights due to delays. Assume that each airline has an identical frequent flyer program. After a quick look online you find the following table describing the delays of these two airlines:

	Delta	American
Delayed	20%	22%
On Time	80%	78%

Is this enough information for you to make a decision? (Assume that this data only includes flights to the cities of interest, and that the only cost/benefit in choosing between the two is the chance of a delayed flight) If not, can you construct one possible scenario in which choosing Delta **doesn't** make sense?

Problem 3

1. Compute the probability distribution of the number of heads in 3 tosses of a fair coin.
2. In class we used the following R code to estimate the distribution of the number of heads in 2 tosses of a fair coin, using 10,000 simulations. Modify the code to estimate the probability distribution of the number of heads in **3 tosses** of a fair coin using **15,000 simulations**. *Hint: you will need to modify the call to the `sample` function; type `?sample` into the R console to get help regarding these arguments if you need it.*

```
library(mosaic)
num.sim = 10000
num.heads.sample = do(num.sim) * {
  coinflips.result = sample(x = c(0, 1),
                           size = 2, replace = TRUE)
  sum(coinflips.result)
}
table(num.heads.sample)/num.sim
```

TO HAND IN: The results of the simulation (your estimated probabilities) in your PDF, and a copy of your R script.