Assignment #4 contains problems about probability. Here are the assigned problems.

From chapter 3, problems 3.1*, 3.3*, 3.9, 3.11, 3.21, and 3.22. (The marked problems require R. Furthermore, you should record your answers to these problems through a web link on the course schedule.)

The assignment requires you to use R. If you wish to install R onto your home computer, please follow the directions about R installation on the course homepage.

For Exercise 3.1, you will use R to take a random sample of ellipses as well as using your judgment to take a sample.

We use the function `sample` to take a random sample in R. The first argument gives the objects to sample from and the second argument is the sample size. By default, sampling is done without replacement. You can sample with replacement by setting the argument `replace=T`.

For example, for Exercise 3.1, you are asked to take a random sample of size 10 from the numbers 0 to 99. This is the command you would type in R to do so.

```
sample(0:99, 10)
```

Exercise 3.3 asks you to sample five digits from 0 to 9 with replacement. Here is R code to do this.

```
sample(0:9, 5, replace=T)
```

Now, if you want to get really fancy, you can type in a set of commands that will repeat the following step twenty times and keep track of how often all five numbers are different. Here is one way to do this. (There are other slicker ways, too.)

```
numAllDifferent = 0
genotAllDifferent = 0
for(i in 1:20) {
  x = sample(0:9, 5, replace=T)
  print(x)
  if(length(unique(x)) == 5) {
    print("All different")
    numAllDifferent = numAllDifferent + 1
  }
  else {
    print("Not all different")
    numNotAllDifferent = numNotAllDifferent + 1
  }
}
numAllDifferent
numNotAllDifferent
```

There are 6 problems, so this assignment is worth 30 HW points. Please do additional problems on your own for extra practice if you feel you need to. The homework is due either in lecture or to your TA by 5pm on Thursday.

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