Stats Theory 1: HW 1

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8/13/2018

Intro to R information

Create a new R markdown file: File -> New File -> R Markdown

Note: basic math can be done in R as well. Example:

```
(5 + 6) / (7 * 3)
```

```
## [1] 0.5238095
```

Learning objectives: dbinom, choose, and a for loop

If you need help with a function, type in help("function")

2b

A particular cancer experiment requires at least two highly susceptible mice. What is the probability that an order of 10 mice from the breeding facility will suffice?

Binomial formula: p(x) = choose(n, x) p^x (1-p)^(n-x)

Binomial R function: dbinom(x, size=n, prob, log = FALSE)

```
1 - dbinom(size = 10, prob = 0.75, x = 0) -  dbinom(size = 10, prob = 0.75, x = 1)
```

```
## [1] 0.9999704
```

2c

Suppose that a particular batch of 7 mice actually contains exactly 3 highly susceptible ones. If the cancer researcher chooses three mice at random from this batch for a particular experiment, what is the probability that at least two of the three mice chosen will be highly susceptible ones?

choose function in R: choose(n, k) with n as size and k an integer

```
1 - (choose(3,0) * choose(4,3)) / choose(7,3) - (choose(3,1) * choose(4,2)) / choose(7,3)
```

```
## [1] 0.3714286
```

```
13/35
```

```
## [1] 0.3714286
```

2d

Notice that we can partition the event space into four possible subsets:

i. 0 out of the 3 mice are highly susceptible.

```
dbinom(size = 3, prob = 0.05, x = 2)
```

```
## [1] 0.007125
```

ii. 1 out of the 3 mice is highly susceptible.

```
dbinom(size = 2, prob = 0.05, x = 1) * 0.15 + (0.05)^2 * 0.85
```

```
## [1] 0.016375
```

iii. 2 out of the 3 mice are highly susceptible.

```
choose(2,1) * (0.15) * (0.05) * (0.85) + (0.15)^2 * (0.95)
```

```
## [1] 0.034125
```

iv. 3 out of the 3 mice are highly susceptible.

```
choose(3,2) * (0.15)^2 * (0.85)
```

```
## [1] 0.057375
```

For loop in R: for(var in seq) expr

for some variable var in the sequence seq, do the expression expr

```
for(i in 0:3) print((choose(3,i) * choose(4, 3-i)) / choose(7,3))
```

```
## [1] 0.1142857
## [1] 0.5142857
## [1] 0.3428571
## [1] 0.02857143
```

```
4/35
```

```
## [1] 0.1142857
```

```
18/35
```

```
## [1] 0.5142857
```

```
12/35
```

```
## [1] 0.3428571
```

```
1/35
```

```
## [1] 0.02857143
```