

```
rep <- c(2,0,5,0,0,38)
dem <- c(8,27,14,1,2,55)
ind <- c(0,0,0,0,0,1)
fem_tot <- sum(rep + ind + dem)
mal_tot <- 535 - fem_tot
san_check <- mal_tot + fem_tot
```

(1) You randomly select one member from the 118th United States Congress.

Q.) What is the probability that this randomly selected member is a female?

A.)

```
prob_fem <- fem_tot / san_check = 0.286
```

Q.) What is the probability that this randomly selected member is a non-white female?

A.)

```
fem_nonwhite <- sum(rep[-6] + dem[-6] + ind[-6])
prob_fem_nonwhite <- fem_nonwhite / san_check = 0.110
```

Q.) What is the probability that this randomly selected member is a male?

A.)

```
prob_mal <- mal_tot / san_check = 0.714
```

(2) You randomly select one member from the 118th United States Congress.

Q.) What is the probability that this randomly selected member is a non-white Republican female?

A.)

```
fem_nonwhite_rep <- sum(rep[-6])
prob_fem_nonwhite_rep <- fem_nonwhite_rep / san_check = 0.013
```

Q.) What is the probability that this randomly selected member is a non-white Democratic female?

A.)

```
fem_nonwhite_dem <- sum(dem[-6])
prob_fem_nonwhite_dem <- fem_nonwhite_dem / san_check = 0.097
```

(3) You randomly select one female member among all the female members in the 118th United States Congress.

Q.) What is the probability that this randomly selected member is a Republican?

A.)

```
prob_fem_rep_from_fem_tot <- sum(rep) / fem_tot = 0.294
```

Q.) What is the probability that this randomly selected member is a Democrat?

A.)

```
prob_fem_dem_from_fem_tot <- sum(dem) / fem_tot = 0.699
```

(4) You randomly select one member from the 118th United States Congress, and then without replacement randomly select a second member.

Q.) What is the probability that both are women?

A.)

```
prob_first_fem <- fem_tot / san_check  
prob_sec_fem <- (fem_tot - 1) / (san_check - 1)  
prob_two_fem <- prob_first_fem * prob_sec_fem = 0.081
```

(5) You randomly select one member from the 118th United States Congress, and then without replacement randomly select a second member.

Q.) What is the probability the first member selected is a man and the second member selected is a Latina/Hispanic woman?

A.)

```
prob_first_mal <- mal_tot / san_check  
prob_sec_fem_hisp <- sum(rep[3] + dem[3] + ind[3]) / (san_check - 1)  
prob_first_mal_sec_fem_hisp <- prob_first_mal * prob_sec_fem_hisp = 0.025
```

(6) You randomly select four members from the 118th United States Congress one at a time and without replacement.

Q.) What is the probability that all four members selected are men?

A.)

```
P(Event = All four are men) + P(Complement = At least one woman) = 1  
Here the complement is easier to calculate than the actual probability. Each draw has an independant chance of drawing a woman, so we  
prob_comp_one_fem <- 1 - (tot_fem / san_check) = 0.714
```

Q.) What is the probability that all four members selected are female?

A.)

```
prob_comp_one_man <- 1 - (mal_tot / san_check) = 0.286
```

(7) You randomly select two members at the same time from the 118th United States Congress.

Q.) What is the probability that both members selected are men?

A.)

```
prob_two_men <- (mal_tot / san_check) * ((mal_tot - 1) / (san_check - 1)) = 0.509
```

Q.) What is the probability that both members selected are female?

A.)

```
prob_two_fem <- (fem_tot / san_check) * ((fem_tot - 1) / (san_check - 1)) = 0.081
```

(8) You randomly select one member from the 118th United States Congress.

Q.) What is the probability that you selected a member who is a female Republican or a Latina/Hispanic woman? (7.5 points)

A.)

```
prob_fem_rep_or_hisp <- ( sum(rep) / san_check ) + ( sum(rep[3] + dem[3] + ind[3]) / san_check ) - ( rep[3] / san_check ) = 0.110
```

(9) You randomly select one member from the 118th United States Congress.

Q.) What is the probability that you selected a member who is an Asian American/Pacific Islander Republican female or an Asian American/Pacific Islander Democratic female?

A.)

```
prob_fem_aapi_fem_or_aapi_dem <- ( rep[3] / san_check ) + ( dem[3] / san_check ) = 0.036
```

(10) The ten Asian American/Pacific Islander women (from all parties) want a group photo of themselves in the U.S. Capital building. If there are ten chairs lined up in a row in the Capital for the photo, how many different ways can the women be seated?

A.)

```
The Fundamental Theory of Counting tells us this is simply factorial(10) = 3628800 combinations
```