Module 1 Assessment

Problem 3

Suppose there are 20 employees on the day shift, 15 on swing, and 10 on nights. You would like to choose 6 at random for an in-depth interview. Let A1 be the event that all 6 are chosen from the day shift, A2 be the event that all 6 are chosen from the swing shift, and A3 the event that all 6 are chosen from the night shift.

a) What is the cardinality of the sample space (the drawing of 6 employees from all shifts)? Assume each employee is unique. Think about what each element, or possible outcome, in the sample space represents.

```
day <- 20
swing <- 15
night <- 10
total <- day + swing + night
sample <- 6
Size = choose(total, sample)
```

b) Assuming that each employee is chosen with equal probaiblity, what is the probability that all 6 chosen employees work the day shift? Note that the employees are chosen sequentially, not all at once. Round your answer to 5 decimal places. Save your answer as P_AllDay.

```
P_AllDay = round((choose(day, sample)*choose(swing,0)*choose(night,0))/Size, 5)
```

c) What is the probability that all 6 workers are selected from the same shift? Again, assume the employees are selected sequentially and not all at once. Round your answer to four decimal places. Save your answer as P_AllSame.

```
P_AllSame = round(((choose(day, sample)*choose(swing,0)*choose(night,0))/Size)
                  + ((choose(day, 0)*choose(swing,sample)*choose(night,0))/Size)
                  + ((choose(day, 0)*choose(swing,0)*choose(night,sample))/Size), 4)
```

d) Find the probability that at least one of the shifts will be unrepresented in the sample of 6 workers. Round your answer to four decimal places. Save your answer as P_NoneOfOneShift.

Hint: We want to solve P(B1UB2UB3). To solve this, it may help to make a venn diagram for these events. Make sure you don't overcount the overlapping areas of this venn diagram!

```
# prob_day_unrepresented <- choose(day, 6) / Size
# prob_swing_unrepresented <- choose(swing, 6) / Size
# prob_night_unrepresented <- choose(night, 6) / Size
#
# prob_two_shifts_unrepresented <- 3 * choose(day + swing, 6) / Size
#
# prob_all_shifts_unrepresented <- 0
#
# P_NoneOfOneShift = round(1-(prob_day_unrepresented + prob_swing_unrepresented + prob_night_unrepresen
P_NoneOfOneShift = 0
```