


Final Exam Review

Q 28 Final exam review questions

40 cards, 4 different colors. Each color has 10 cards # 1-10. Pick two cards (w/out replacement)
want: probability that the two cards have different #s
and different colors

40 cards

□ □ □ ... □ □ □

#	1	2	3	...	10	1	2	3	...	10	1	...	10	1	...	10
color	1	1	1	...	1	2	2	2	...	2	3	...	3	4	...	4

card-numbers $\leftarrow \text{rep}(1:10, 4)$

card-colors $\leftarrow \text{rep}(1:4, \text{each} = 10)$

$\leftarrow \underbrace{1, 1, 1, \dots, 1}_{10 \text{ times}}, \underbrace{2, 2, 2, \dots, 2}_{10 \text{ times}}, \dots$

```
nsim <- 1000  
results <- rep(NA, nsim)
```

```
card-numbers <- rep(1:10, 4)
```

```
card-colors <- rep(1:4, each=10)
```

← $\underbrace{1, 1, 1, \dots, 1}_{10 \text{ times}}, \underbrace{2, 2, 2, \dots, 2}_{10 \text{ times}}, \dots$

```
for(i in 1:nsim) {
```

```
  cards_drawn <- sample(1:40, 2, replace=F)
```

```
  results[i] <- (card-numbers[cards_drawn[1]] != card-numbers[cards_drawn[2]])  
  & (card-colors[cards_drawn[1]] != card-colors[cards_drawn[2]])
```

```
}
```

```
mean(results)
```

```
f1(g1(3))
```

Exercise 9.

```
f1 <- function(n, groups){
```

```
  x <- matrix(1, nrow=n, ncol=n)
```

```
  unique_groups = unique(groups) ← get the unique group values : c(1,2)
```

```
  means <- matrix(nrow = length(unique_groups), ncol = n) ←
```

```
  for(i in 1:length(unique_groups)){
```

```
    means[i,] <- colMeans(x[groups == unique_groups[i],]) (2x5)
```

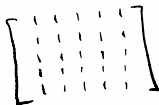
```
  }
```

```
  return(means)
```

```
}
```

```
f1(5, groups = c(1, 1, 2, 2, 2))
```

create a matrix of size $n \times n$
of all 1s:



$i = 1:$

$x[\text{groups} == 1,]$

\rightarrow



$\text{colMeans}(x[\text{groups} == 1,]) \rightarrow 1 \ 1 \ 1 \ 1 \ 1$

\Rightarrow means : $\begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ NA & NA & NA & NA & NA \end{bmatrix}$

Now repeat for $i = 2:$

means: $\begin{bmatrix} 1 & 1 & 1 & 1 & 1 \end{bmatrix}$