Randomization tests

Test of independence

Participants in the study were 48 bank supervisors who identified as male and were attending a management institute at UNC in 1972. Each supervisor was asked to assume the role of personnel director of a bank.

- Each person given a file to judge whether the person in the file should be promoted
- The files were identical, except half of them indicated that the candidate was male, and the other half were indicated as female
- Files were randomly assigned to bank managers

Research question: **Are individuals who identify their sex as female discriminated against in promotion decisions made by their managers who identify as male?**

Step 1

H_0 :

H_A :

Step 2

```
discrimination |>
  slice(1:3)
```

```
     sex    decision
1   male     promote
2 female not promote
3   male     promote
```

sex	not promote	promote	total
female	10	14	24
male	3	21	24
total	13	35	48

Obtain some relevant/useful summary statistics:

$\alpha =$

Step 3

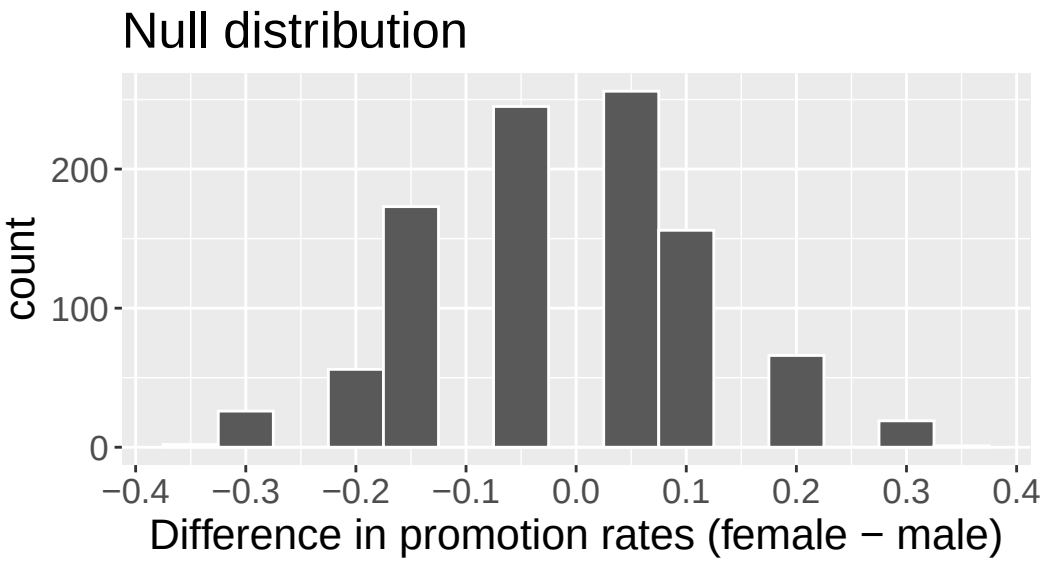
Simulate under H_0:

- Write down "promote" on _____ cards and "_____" on _____ cards.
- Then repeat the following B times:
    1. Shuffle the cards
    2. Deal out a stack of _____ to represent _____ candidates and _____ to represent _____ candidates.
    3.

```r
set.seed(100)
n <- nrow(discrimination)
n_f <- sum(discrimination$sex == "female")
n_m <- sum(discrimination$sex == "male")
decisions <- discrimination$decision
B <- 1000
diff_props_null <- rep(NA, B)
for(b in 1:B){
  shuffled <- sample(decisions, n)
  rand_f <- shuffled[1:n_f]
  rand_m <- shuffled[-c(1:n_f)]

  p_f_sim <-  mean(rand_f == "promote")
  p_m_sim <-mean(rand_m == "promote")

  diff_props_null[b] <- p_f_sim - p_m_sim
}
```



- p-value:

Step 4

- Decision:

- Conclusion:

- Possible error:

Test for difference in proportions

An experiment was conducted, consisting of two treatments on 90 patients who underwent CPR for a heart attack and subsequently went to the hospital. Each patient was randomly assigned to either:

- treatment group: received a blood thinner
- control group: did not receive a blood thinner

For each patient, the outcome recorded was whether they survived for at least 24 hours.

Research question: **Is the blood thinner treatment effective for patients who undergo CPR after a heart attack??**

Step 1

H_0 :

H_A :

Step 2

```
cpr |>
  slice(1:3)
```

```
      group  outcome
1 treatment     died
2   control     died
3   control survived
```

group	died	survived	total
control	39	11	50
treatment	26	14	40
total	65	25	90

Obtain some relevant/useful summary statistics:

$\alpha =$

Step 3

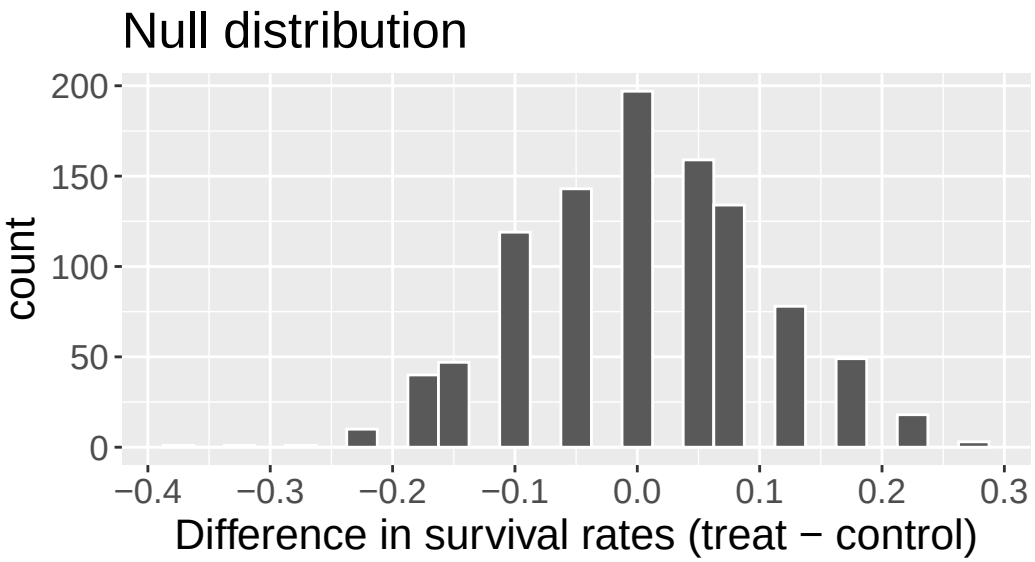
Simulate under H_0:

- Write down "_____" on _____ cards and "_____" on _____ cards.
- Then repeat the following B times:
    1. Shuffle the cards
    2. Deal out a stack of _____ to represent _____ candidates and _____ to represent _____ candidates.
    3.

```r
set.seed(310)
n_t <- sum(cpr$group == "treatment")
n_c <- sum(cpr$group == "control")
cards <- cpr$outcome
B <- 1000
diff_props_null <- rep(NA , B)
for(b in 1:B){
  shuffled <- sample(cards)
  treat_sim <- shuffled[1:n_t]
  control_sim <- shuffled[-c(1:n_t)]

  p_t_sim <- mean(treat_sim == "survived")
  p_c_sim <- mean(control_sim == "survived")

  diff_props_null[b] <- p_t_sim - p_c_sim
}
```



- p-value:

Step 4

- Decision:

- Conclusion:

- Possible error: