Hypothesis Testing via Exact Probability and the Normal Approximation

Recap from last time . . .

The Hypotheses

Let p be the true proportion of Americans who favor same-sex marriage.
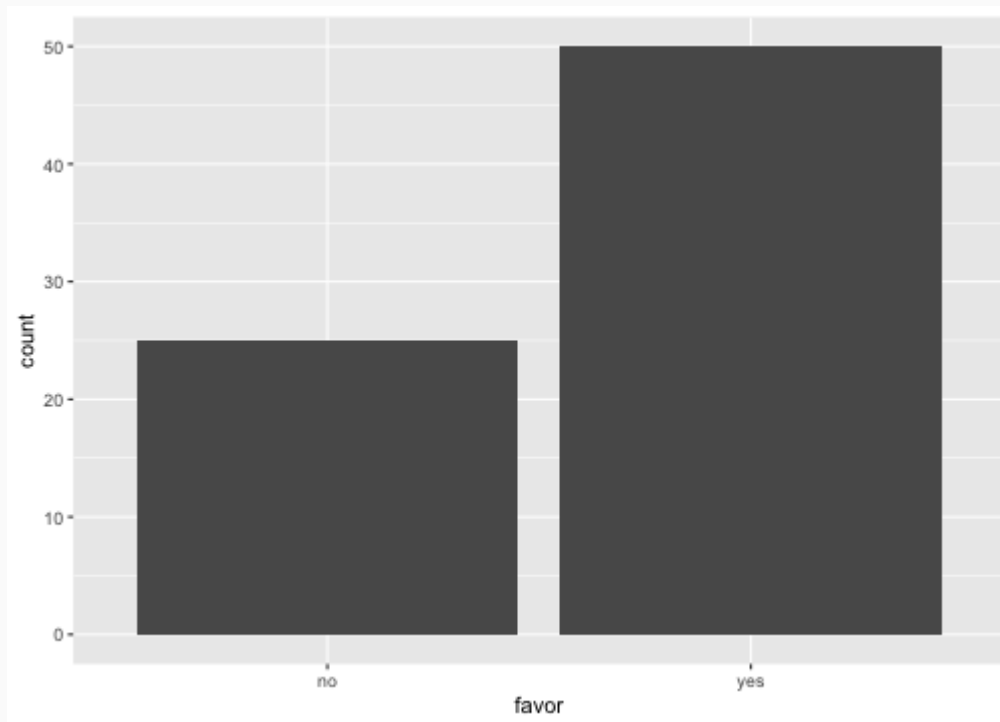
$$H_0 : p = 0.5$$

$$H_A : p \neq 0.5$$

The Data

```
p_hat <- d %>%
  specify(response = favor, success = "yes") %>%
  calculate(stat = "prop") %>%
  pull()
p_hat
```
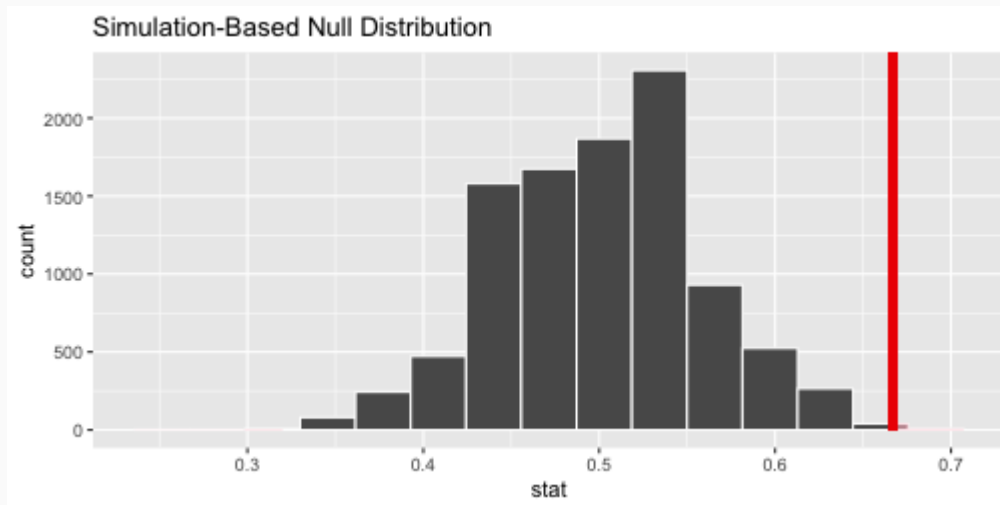
```
## [1] 0.67
```

The Data, cont.

```
d %>%
  ggplot(aes(x = favor)) +
  geom_bar()
```

Visualizing the Null

```r
null <- d %>%
  specify(response = favor, success = "yes") %>%
  hypothesize(null = "point", p = .5) %>%
  generate(reps = 10000, type = "simulate") %>%
  calculate(stat = "prop")
null %>%
  visualize() +
  shade_p_value(obs_stat = p_hat,
                direction = "both")
```


Simulation-Based Null Distribution

Computing a p-value

```
null %>%
   get_p_value(obs_stat = p_hat,
               direction = "both")
```

```
## # A tibble: 1 x 1
##   p_value
##     <dbl>
## 1  0.0054
```

Exact and Approximate

The Normal Distribution in R

If you have a quantile and need a probability...

```
pnorm(q = -1, mean = 0, sd = 1)
```

[1] 0.16

```
pnorm(q = 2.9, mean = 3.1, sd = .2)
```

[1] 0.16

If you have a probability and need a quantile...

```
qnorm(.15)
```

[1] -1