

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.

$$H_0 : p = 0.5$$

$$H_A : p \neq 0.5$$

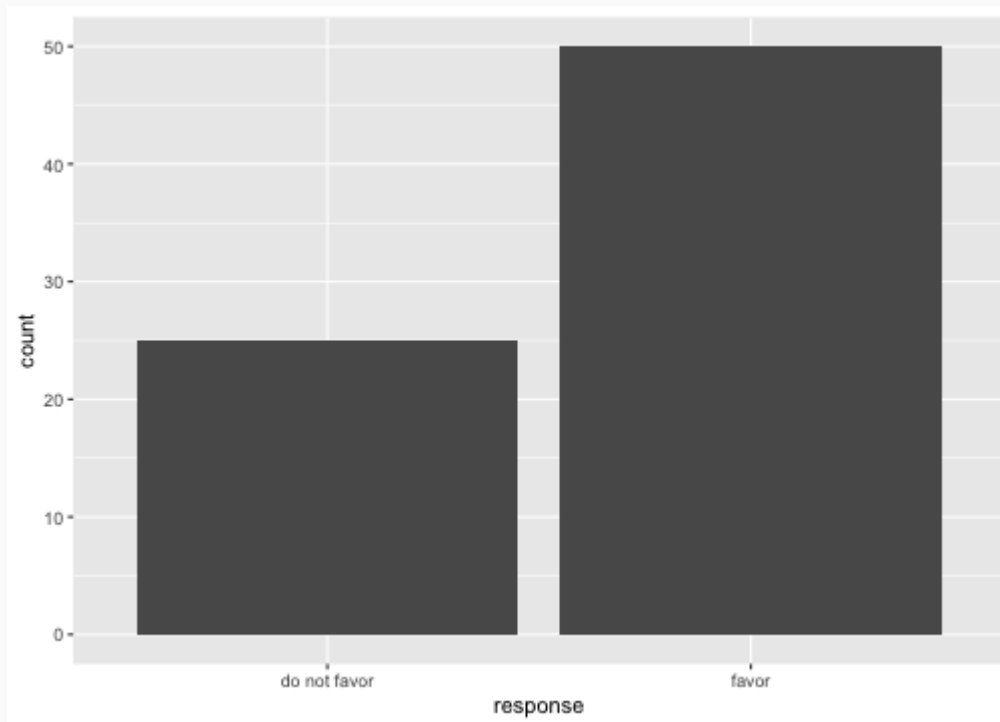
The Data

```
p_hat <- millenials %>%  
  specify(response = response,  
           success = "favor") %>%  
  calculate(stat = "prop")  
p_hat
```

```
## # A tibble: 1 x 1  
##   stat  
##   <dbl>  
## 1 0.667
```

The Data, cont.

```
millenials %>%  
  ggplot(aes(x = response)) +  
  geom_bar()
```



Visualizing the Null

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

Computing a p-value

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

```
## # A tibble: 1 x 1  
##   p_value  
##   <dbl>  
## 1  0.0042
```

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
```