Consider values of the test <u>statistic</u> which are most ⟶ based on the null hypothesis

unusual and would be more typical if the alternative were

true.

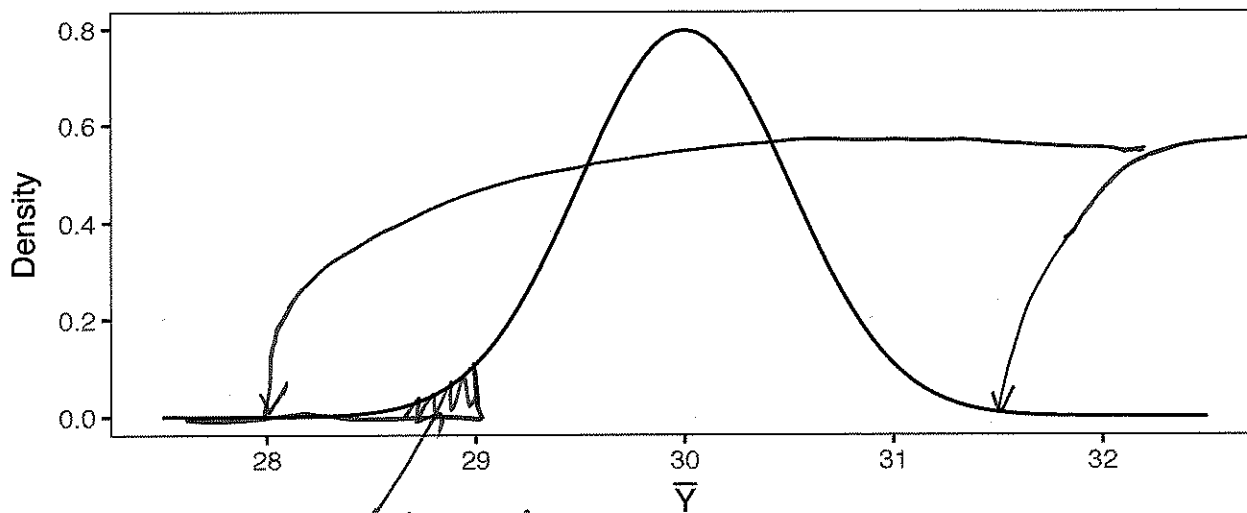$$\overline{Y} \sim N\left(\mu, \frac{\sigma^2}{n}\right)$$

(for now assume $\sigma^2 = 25$)

If null hypothesis were true: $\overline{Y} \sim N\left(30, \frac{25}{100}\right)$

question of interest: $H_0: \mu = 30$ study design: $n = 100$

Sampling distribution of sample mean

Assuming Null hypothesis is true

these are "unusual"

$H_A: \mu < 30$

more typical if alternative is true

More typical values under the alternative would be on the low side

of the distribution.

10

Rejection region will be of the form: Reject H_0 if $T < c_L$

c_U c_L are are chosen to obtain the desired significance level.

What value of c_L, gives $P_{H_0}(\text{Reject } H_0) = \underline{\alpha = 0.05}$?

arbitrary

<u>Sampling distribution of sample mean</u>

Assuming Null hypothesis is true

area = 0.05

Reject H_0

if $\overline{Y} < 29.18$

```
qnorm(0.05, mean = 30, sd = sqrt(25/100)) = 29.18
```

H_0:   'known' n