

### Example #3

The mean response time of a species of pigs to a stimulus is 0.8 s. Twenty-eight pigs were given 2oz of alcohol and then tested. If their average response time was 1.0 s, with a standard deviation of 0.3 s, can we conclude that alcohol affects the mean response time? Use 5% level of significance

$$n = 28, \quad \bar{X} = 1.0, \quad s = 0.3, \quad \alpha = 0.05$$

Let  $H_0: \mu = 0.8$  and  $H_a: \mu \neq 0.8$  (two-sided hypothesis)

use the Student's  $t$  distribution. The value of the  $t$  random variable we observed is

$$t_{27} = \frac{\bar{X} - \mu}{s/\sqrt{n}} = \frac{1.0 - 0.8}{0.3/\sqrt{28}} = 3.52$$

the critical value in this test is

$$t_{27, 0.025} = 2.0518$$

Since  $t_{27} > t_{27, 0.025}$ , we reject  $H_0$  and conclude that alcohol affects the response time of pigs

In fact, the  $p$ -value for this data set is 0.0015, so these results are very significant

