

## Comparing Two Proportions

### **Dreaming in Black and White**

A study was conducted to determine the proportion of people who dream in black and white instead of color. Among 306 people over the age of 55, 68 dream in black and white, and among 298 people under the age of 25, 13 dream in black and white. We want to use a 0.01 significance level to test the claim that the proportion of people over 55 who dream in black and white is greater than the proportion of those under 25.

Group 1: People over 55

Group 2: People under 25

Write down information you will need:

$$\begin{array}{lll} n_1 = 306 & x_1 = 68 & \alpha = 0.01 \\ n_2 = 298 & x_2 = 13 & \end{array}$$

We are testing that people over 55 dream in black and white more than people under 25, or Group 1 > Group 2.

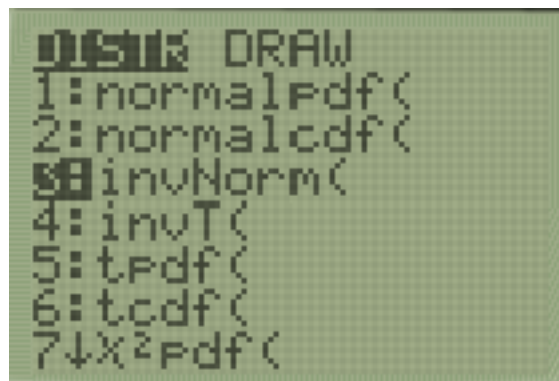
$$H_0 = p_1 \leq p_2$$

$$H_A = p_1 > p_2$$

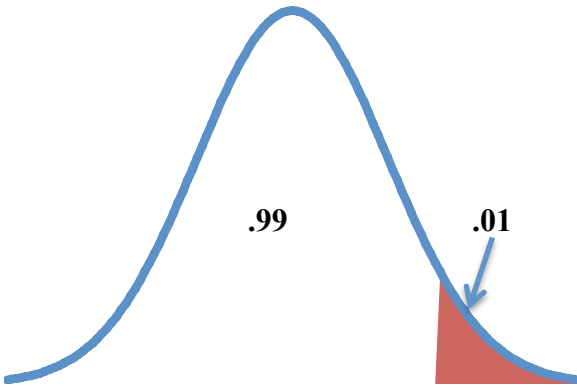
Now we have what we need to use our calculator.

### Calculating Critical Value

Push **2ND**, then **VARS**. Select **invNorm**( and hit **ENTER**.



Next, we need to input three numbers into this function. First is the area from the left leading up to our rejection region (0.99), and then 0 and 1. Then hit **ENTER**. The number below is our critical value.



```
invNorm(.99,0,1)
2.326347877
```

**Calculating Test Statistic and P Value**

Push **STAT**, then select **TESTS** in the upper right hand corner. Select **2-PropZTest...** and hit **ENTER**.

```
STAT CALC TESTS
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor
```

```
EDIT CALC TESTS
1: Z-Test...
2: T-Test...
3: 2-SampZTest...
4: 2-SampTTest...
5: 1-PropZTest...
6: 2-PropZTest...
7: ZInterval...
```

Next, add in the data for both groups and choose our alternative hypothesis ( $H_A = \mu_1 > \mu_2$ ). Now select **Calculate** and hit **ENTER**. The **z** = is our test statistic and the **p** = is our p value.

```
2-PropZTest
x1:68
n1:306
x2:13
n2:298
P1:≠P2 <P2 >P2
Calculate Draw
```

```
2-PropZTest
P1 > P2
z=6.439775102
P=6.010974E-11
P1=.2222222222
P2=.0436241611
↓P=.1341059603
```

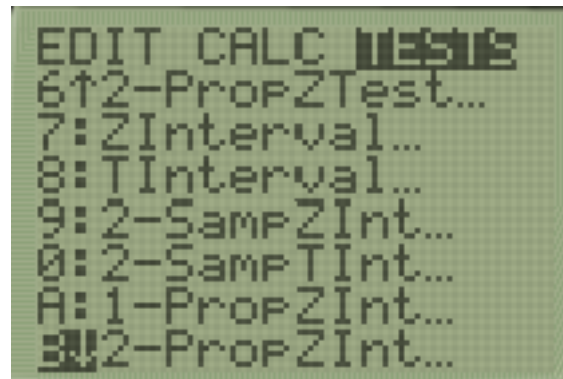
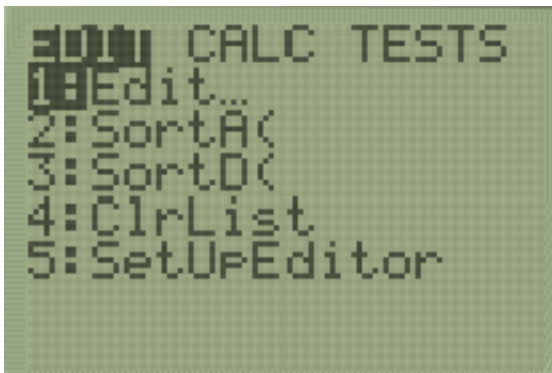
## Calculating a Confidence Interval

There is one more piece of information we need before calculating a Confidence Interval: What level of confidence should we use?

Please use the following table for choosing your confidence level. We have a one-tailed test and  $\alpha = 0.01$ , so we will use a confidence level of 98%.

	$\alpha$	Two-Tailed Test	One-Tailed Test
Significance Level for Hypothesis Test	0.01	99%	98%
	0.05	95%	90%
	0.10	90%	80%

Push **STAT**, then select **TESTS** in the upper right hand corner. Select **2-PropZInt...** and hit **ENTER**.



Next, add in the data for both groups and choose our confidence level (98%). Now select **Calculate** and hit **ENTER**. The top numbers in parentheses is our confidence interval.

