1 Parameter of Interest

Let p_1 be the true proportion of fish in a lake that is cod. Let p_2 be the true proportion of fish in a lake that is bass. The first population size is sufficiently large. The second population size is sufficiently large.

2 Hypotheses

$H_0 : p_1 - p_2 = 0 \qquad H_A : p_1 - p_2 \neq 0$

3 Verifying Assumptions

$n_1 = 70 \qquad x_1 = 13 \qquad \hat{p}_1 = x_1/n = 13/70 = 0.185714$
$n_2 = 58 \qquad x_2 = 7 \qquad \hat{p}_2 = x_2/n = 7/58 = 0.12069$
SRS, independent
$n_1\hat{p}_1 > 10$, $n_1 \leq 10\%$ of the first population size
$n_2\hat{p}_2 \leq 10$ (proceed with caution), $n_2 \leq 10\%$ of the second population size

4 Name of Test

Two proportion z-test

5 Test Statistic

$\hat{p}_{pooled} = \frac{\hat{p}_1+\hat{p}_2}{n_1+n_2} = \frac{0.185714+0.12069}{70+58} = 0.00239378$
$\hat{z} = \frac{(\hat{p}_1-\hat{p}_2)-p_0}{\sqrt{\hat{p}_{pooled}(1-\hat{p}_{pooled})\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}} = \frac{(0.185714-0.12069)-0}{\sqrt{0.00239378(1-0.00239378)\left(\frac{1}{70}+\frac{1}{58}\right)}} = 7.49401$

6 p-value

$P(z < -|\hat{z}| \cup z > |\hat{z}|) = 2 * P(z > |\hat{z}|) = 2 * P(z > 7.49401) = 6.72795e - 14$

7 Conclusion

$\alpha = 0.05$
Reject H_0. There is significant evidence ($p = 6.72795e - 14$) that the difference between the true proportion of fish in a lake that is cod and the true proportion of fish in a lake that is bass is not 0.