# 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.