

Math 5090

9/12/2016

A coin is tossed 3 times, resulting in H, H, T. Give an approximate 20% equal-tailed confidence interval for  $p$ , the probability that the next toss will result in heads; assume that tosses are independent. You may use the standard notation for percentiles in your answer.

Write an appropriate probability statement.

$$.20 \approx P\left(z_{.4} < \frac{-\bar{X} + p}{\sqrt{\frac{\bar{X}(1-\bar{X})}{3}}} < z_{.6}\right)$$

Note that the approximation is poor because  $n=3$ .

Rewrite the statement to isolate  $p$ .

$$= P\left(z_{.4} \sqrt{\frac{\bar{X}(1-\bar{X})}{3}} + \bar{X} < p < z_{.6} \sqrt{\frac{\bar{X}(1-\bar{X})}{3}} + \bar{X}\right)$$

Write the random interval.

$$\left(z_{.4} \sqrt{\frac{\bar{X}(1-\bar{X})}{3}} + \bar{X}, z_{.6} \sqrt{\frac{\bar{X}(1-\bar{X})}{3}} + \bar{X}\right)$$

Write the outcome of the random interval (i.e. confidence interval).

$$\left(z_{.4} \sqrt{\frac{\frac{2}{3} \cdot \frac{1}{3}}{3}} + \frac{2}{3}, z_{.6} \sqrt{\frac{\frac{2}{27}}{3}} + \frac{2}{3}\right)$$