

Homework assignment #10

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2021-10-24

Problem #1 (10 points)

You are rolling a fair dodecahedral (20-sided) die with numbers 1 – 20 noted its sides. You win if the number rolled is prime and you lose if it is not. What is the probability that you win at most 200 times in 500 rolls? Calculate your answer **both**:

- (i) (4 points) using **R** without an approximation, and
- (ii) (6 points) using the normal approximation.

Problem #2 (10 points)

A biased coin (probability of $\{\text{heads}\}$ is 0.7) is tossed 1000 times. Write down the exact expression for the probability that more than 750 $\{\text{heads}\}$ have been observed.

- (i) (4 points) Use **R** to calculate this probability.
- (ii) (6 points) Use the normal approximation to approximate this probability.

Problem #3 (2+2+4+1+1=10 points)

Solve **Exercise 6.8** from the textbook.

Problem #4 (4 + 4 = 8 points)

Solve **Exercise 6.14** from the textbook.

Problem #5 (4 points)

Solve **Exercise 6.16** from the textbook.

Problem #6 (4 points)

In a random sample of 1000 small children, it was found that 880 of them observe Halloween. Find the 80%-confidence interval for the population proportion of children who observe Halloween.

Problem #7 (4 points)

Let p denote the population proportion. How large should the sample size be so that one is at least 95% confident that the true parameter p is within a 0.02 margin of error from the point estimate?