

# Math 483, Fall 2019. Homework 9

## Due November 14.

NAME \_\_\_\_\_

From the book: Chapter 10, problem 14

**Problem A.** For a sample  $X_1, \dots, X_n$  from the Poisson distribution with the mean  $\theta = \mu$ , apply the Wald test for

$$\begin{cases} H_0 : \theta = 30 \\ H_1 : \theta \neq 30 \end{cases}$$

Calculate the p-value for the data  $\bar{X} = 31.5$ ,  $n = 120$ . Will you reject  $H_0$  at  $\alpha = 0.02$ ?

Calculate the 98% confidence interval and confirm your p-value based answer.

**Problem B.** For the Wald test based on proportion ( $X \sim \text{Binomial}(n, p)$ ) with test statistic  $W = \frac{\hat{p} - p_0}{\sqrt{p_0(1 - p_0)/n}}$  and

$$\begin{cases} H_0 : p = 0.5 \\ H_1 : p \neq 0.5 \end{cases}$$

calculate the power of the test for  $n = 500$ ,  $p = 0.55$ ,  $\alpha = 0.1$ .

Plot the power function in the range  $0.4 \leq p \leq 0.6$

**Problem C.** For four Calculus I sections, the number of people who had a failing grade at mid-semester was tabulated

Number of students	35	50	48	52
Number failing	12	10	6	8

Is there evidence that failure rates ( $p_i$ ) are not all the same for these 4 sections? [Hint: Apply the chi-square test.]