MATH 10B
Section 205
GSI: Theo McKenzie

Quiz 12

Student:
SID:
Tue 4/23/19

True/False - No explanation needed. (For each: 1 point if correct, 0 points if not answered, -1 points if incorrect)

1. For an exponential distribution with PDF ce^{-cx} for $x \geq 0$, the maximum likelihood parameter $\hat{c}$ is unbiased. True/False

   False. This is equivalent to saying that $E\frac{1}{X} = c$ for an exponential distribution, which is false.

2. Testing a two sided alternative leads to calculating probabilities of the form $P(|X| \geq |r|)$ or $P[|Z| \geq |z|]$. True/False

   False. This assumes that our distribution is symmetric around 0, which is not necessarily true.

Problems - Needs justification.

1. Judie measures the size of butterflies. The wingspan of each type of butterfly is normally distributed with a standard deviation of 2 mms. Judie's null hypothesis is that a certain butterfly is a skipper, which has average wingspan of 26 mms. Her alternative hypothesis is that it is a butterfly with a **bigger** wingspan with significance level $\alpha = 0.04$. She measures a wingspan of 30 mms.

   (a) What is the rejection region associated with this problem?

   (b) What is Judie's conclusion?

   (10 points)

   The rejection region is the area such that $P(X > r_0) = \alpha$, so in this case it would be the region such that $P(X > r_0) = \alpha$, so $P(\frac{X-\mu}{\sigma} > \frac{r_0-\mu}{\sigma}) = \alpha$, so .5-$z(\frac{r_0-\mu}{\sigma} = .04$. By looking at the z-table, we see that $\frac{r_0-\mu}{\sigma} \approx 1.75$.

   Therefore $r_0 \approx 29.5$ and the rejection region is $[29.5, \infty)$.

   30 is in the rejection region, so Judie will refute the null hypothesis. We could also calculate the p-value and show that it is less than α.