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Assignment 4

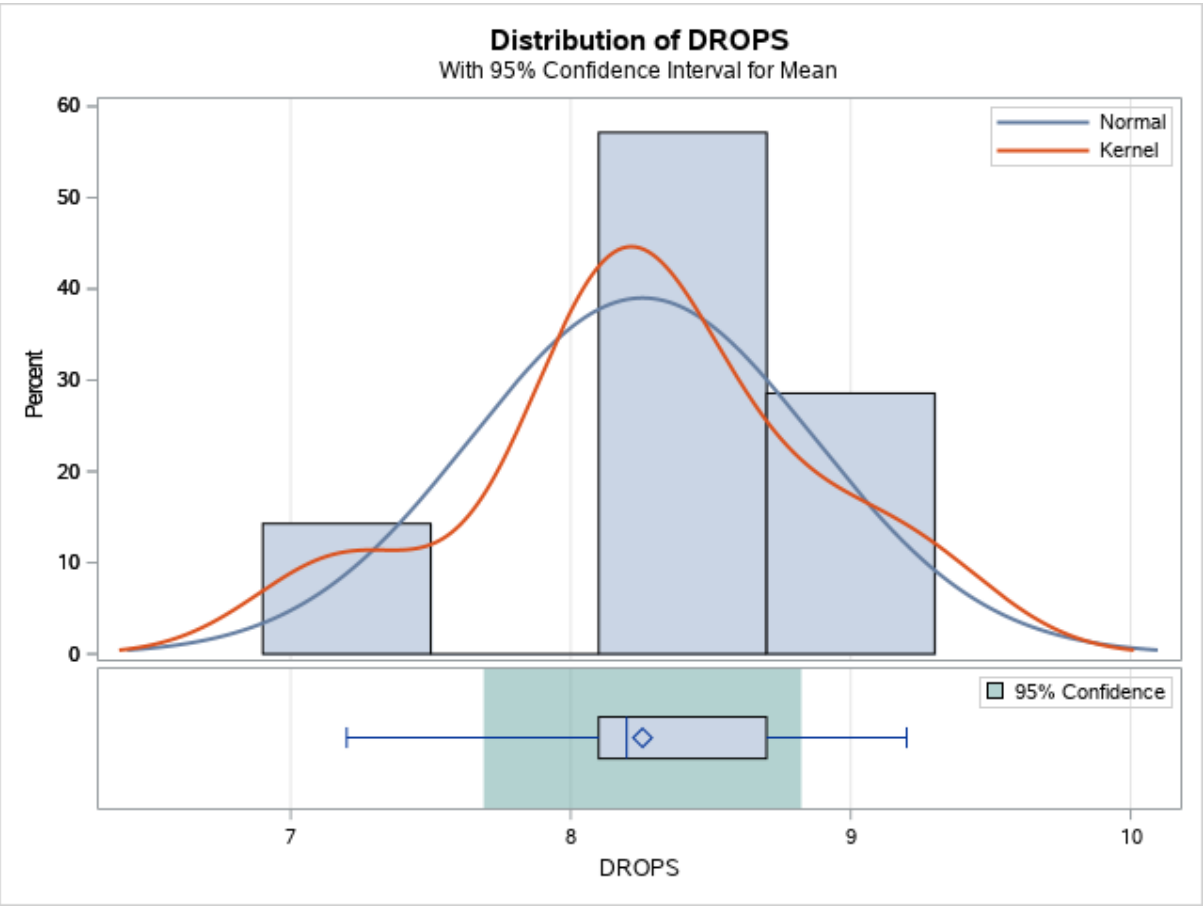
1

a)

H_0: Air conditioning does have a significant impact, $\mu = 12.85$
H_1: Air conditioning doesn't have a significant impact, $\mu \neq 12.85$

```
DATA RECORDEDDROPS;
INPUT DROPS @@;
DATALINES;
8.1 8.2 7.2 8.1 8.3 8.7 9.2
;
RUN;

PROC TTEST DATA=RECORDEDDROPS H0=12.85;
RUN;
```

	DF	t Value	Pr > |t|
	6	-19.81	<.0001

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b) from the data we can see that the data is normally distributed as shown on the ttest graph plotted. There is a peak but data is distributed in segments. Because of the distribution we can see from our data that if we had access to more values and readings taken they would be close to the sample mean distribution which would indicate readings being taken around 8.3 years.

c) The P value found is < 0.0001

d) Because the P value found is less than 0.05 we can effectively reject the null hypothesis and accept the alternative hypothesis

e) From the P value found we can determine that using the air conditioning does not cause a significant impact in the pitch drop recorded over the years. Although on average it took slightly longer it did not have a great effect on the experiment.

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2.
a)
H_0:THE DICE IS LOADED – The probability of rolling the sixes is $\mu = 0.2947$ (56/190)
H_1:THE DICE IS NOT LOADED – probability of rolling the sixes is not $\mu \neq 0.2947$

```
DATA DICE;
INPUT OCCURANCES$ COUNT;
DATALINES;
SIX 56
NOTSIX 134
;
RUN;

PROC FREQ DATA = DICE ORDER =DATA;
WEIGHT COUNT;
TABLES OCCURANCES / BINOMIAL (P=0.2947);
RUN;
```

Test of H0: Proportion = 0.2947	
ASE under H0	0.0331
Z	0.0011
One-sided Pr > Z	0.4996
Two-sided Pr > |Z|	0.9991

b)
THE DATA PRODUCED HAS FOUND A P VALUE OF 0.9991 from a hypothesised loaded $\mu = 0.2947$.
Using the same code if we used P=0.1667 (1/6 which is what a fair dice should be) our P value would have been <0.0001, supporting the alternative hypothesis

c) FROM THE P VALUE WE CAN ACCEPT THE NULL HYPOTHESIS THAT THE DICE IS LOADED AND REJECT THE ALTERNATE HYPOTHESIS AS IT IS GREATER THAN 5%

d) In conclusion the dice is found to be loaded. Usually a non-loaded dice would see a probability of 1/6 chance of getting a six which would mean almost 32 occurrences, yet here we see significantly more to be able to conclude it as very abnormal. However this is a probability and we can infer that it is likely this dice is loaded, because of the significance level being greater than 5%.
In a casino where the probabilities should be where the conditions are fair and unpredictable a case for a loaded die is cheating and so in the case of this dice, for the sake of fairness it should be removed from play.

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