ANALYZE Phase - Practice Exam Questions Start Time: _____

1. **You've sampled 15 units from the latest production lot to measure the weight of the parts. You calculate the sample mean to be 8.75 lbs, and the sample standard deviation to be 1.44 lbs. Calculate the 95% confidence interval for the population mean.**
   - 7.95 – 9.55
   - 8.09 – 9.41
   - 7.31 – 10.19
   - 8.25 – 9.25

2. **You're creating a linear regression model for your data and you've calculated the values below. What is the Y-intercept for your regression model?** $(\bar{X} = 9.5,\ \bar{Y} = 180,\ \beta_1 = 4)$
   - 19
   - 142
   - 45
   - 200

3. **The one-way ANOVA Analysis below has 19 treatment groups with the total degrees of freedom of 37. Complete this ANOVA table and calculate the F-value.**
   - 3.66
   - 1.95
   - 6.51
   - 0.42

Variation Source	Sum of Squares (SS)	Degrees of freedom (DF)	Mean Squares (MS)	F-Value
Treatment (Between)	370			
Error (Within)				
Total	430			

4. **Your manufacturing process has a historical yield loss average of 8%. You made a change to the process and you'd like to determine if this change has impacted the yield loss. You sample 70 units and find 9 units are non-conforming.**

   Based on this sample, can we conclude that the proportion of defects in this lot is different than the historical average using a significance level of 5%? Identify the statement below that is true.

   - We must reject the null hypothesis because the z-statistics is greater than the critical z-score
   - We must accept the null hypothesis because the z-statistics is greater than the critical z-score
   - We must reject the alternative hypothesis because the z-statistics is greater than the critical z-score
   - We must fail to reject the null hypothesis because the z-statistics does not fall into the rejection region

5. **You're attempting to characterize the variation of your product over time, so you've setup a data collection plan to measure product across multiple months. How is this type of variation described from the multi-variate analysis perspective?**
    - Cyclical
    - Temporal
    - Positional
    - Common

6. **You've sampled 15 units from the latest production lot to measure the weight of the parts. You calculate the sample mean to be 4.65 lbs, and the sample standard deviation to be 0.55 lbs. Calculate the 95% confidence interval for the population standard deviation.**
    - 0.417 - 0.898
    - 0.162 - 0.752
    - 0.382 - 0.718
    - 0.403 - 0.867

7. **Identify the statement below regarding hypothesis testing that is true:**
    - Power can be thought of as the probability of avoiding a Type II error.
    - The probability of occurrence of a Type I error is defined as the Beta (β) risk.
    - The alpha risk in hypothesis testing is analogous to the consumers risk in the world of acceptance sampling.
    - Failing to reject the null hypothesis is analogous to proving that the null hypothesis is true.

8. **You're creating a linear regression model for your data and you've calculated the following least squares estimates (S_{yy} = 41, S_{xy} = 19, S_{xx} = 20). Based on these results, what percentage of variation in Y, can be explained by the variation in X?**
    - 15%
    - 66%
    - 2%
    - 44%

9. **You're performing a hypothesis test for the population mean, which you believe to be 7.50". You sample 60 parts and find the sample mean to be 7.35". The population standard deviation is known to be 0.80". What is the test statistic for this hypothesis test?**
    - 1.45
    - -1.45
    - -1.82
    - 1.82

10. Which distribution is used to make the accept/reject decision for the ANOVA Analysis:

- Chi-squared Distribution
- T Distribution
- Normal Distribution
- F Distribution

11. You're creating a linear regression model for your data and you've calculated the following values. What is the predicted value of Y when X = 12? (S_{yy} = 192, S_{xy} = 32, S_{xx} = 96, β_0 = 9)

- 111.0
- 45.0
- 13.0
- 108.3

12. You've sampled 25 units from the last production lot and found that 4 of them are non-conforming. Find the 95% confidence interval for the true population proportion of defective products.

- $0.09 < p < 0.23$
- $0.02 < p < 0.30$
- $0.04 < p < 0.28$
- $0 < p < 0.35$

13. Match the following terms with their appropriate location on this table of Null & Alternative Hypothesis:

- Correct Decision to Reject the Null Hypothesis
- Type II Error (Beta Risk)
- Type I Error (Alpha Risk)
- Correct Decision to Fail to Reject the Null Hypothesis

		The Truth	
		H_0 is True	H_0 is False
The Outcome of the Hypothesis Test	Fail to Reject H_0	A	B
	Reject H_0	C	*D*

14. **Your manufacturing process has a particular step that is performed by two different machines that you believe to be identical. Prior to testing the mean values associated with your two processes, you want to test your assumption of the homogeneity of variances. You take a sample of 10 units from machine A and 9 samples from Machine B and measure the sample variance of each machine to be 0.17 and 0.25 respectively.**

    You want to use the significance level of 10% to test the hypothesis that the variances from each machine are equal. Identify the statement below that is true.

    - We must reject the null hypothesis because the test statistics is greater than the critical score.
    - We must reject the alternative hypothesis because the test statistics is greater than the critical score.
    - We must fail to reject the null hypothesis because the test statistics is greater than the critical score.
    - We must fail to reject the null hypothesis because the test statistics does not fall into the rejection region.

15. **You're creating a linear regression model for your data and you've calculated the following least squares estimates (S_{yy} = 5,300, S_{xy} = -2,500, S_{xx} = 3,100). What is the correlation coefficient for this data set?**
    - 0.38
    - -0.62
    - -0.47
    - 0.62

Completion! *(Congrats)* Finish Time: _____