CQE – Pillar 6: Statistics
Practice Exam 2: Questions

Start Time: _____

1. **You're manufacturing a widget and using an X-bar and S chart to control the critical feature of the product. Your normal process has the following attributes: X-double bar is 12.5, S-bar is 1.6, n = 10. Identify the lower control limits for the X-bar chart:**
   - 9.65
   - 10.94
   - 11.26
   - 14.06

2. **You're randomly selecting a card from a 52-card deck. What is the probability of selecting a three, a seven or a King?**
   - 16 in 52
   - 12 in 52
   - 8 in 52
   - 4 in 52

3. **Calculate P_{pk} for the following parameters: (LSL = 600, T = 625, USL = 655, σ = 5.5, μ = 633)**
   - 0.67
   - 1.0
   - 1.33
   - 1.67

4. **Calculate the sample standard deviation of the following data set: 3, 4, 7, 10**
   - 7.50
   - 10.0
   - 2.74
   - 3.16

5. **How many treatments would be required for a DOE with 3 factors where a half factorial design is chosen?**
   - 3
   - 8
   - 4
   - 2

6. **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			

7. **A control chart showed a data point outside the control limit however no action was taken. What is this an example of?**
   - Common cause variation
   - The re-sampling fallacy
   - Under Adjustment
   - Over Adjustment

8. **According to a recent survey, 35% of households in the U.S. have a pet. If you were to randomly select 10 houses, what is the likelihood that two of them have a pet?**
   - 20.0%
   - 57.1%
   - 35.0%
   - 17.6%

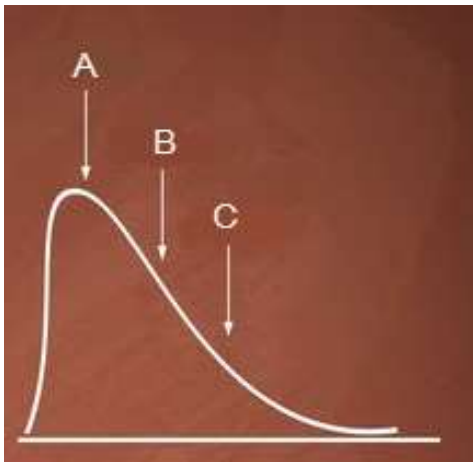
9. **You're creating a linear regression model for your data and you've calculated the following values. What is the predicted value of Y when X = 12? (S_{yy} = 192, S_{xy} = 32, S_{xx} = 96, β_0 = 9)**
   - 111.0
   - 45.0
   - 13.0
   - 108.3

10. **You performed a full factorial DOE to improve the yield of a process with two factors at two levels and have measured the following response values. What is the estimated effect of Factor A?**
    - -9.5
    - -21.5
    - 11
    - -8

		Factors		Response
		A	B	% Yield
Treatments	1	+	+	**64**
	2	-	+	**75**
	3	+	-	**87**
	4	-	-	**95**

11. Which characteristic of this distribution is located at point A on the image below?

- Skewness
- Median
- Mode
- Mean



12. Calculate C_r for the following parameters: (USL = 630, T = 590, LSL = 570, μ = 610, σ = 10)

- 0.60
- 0.95
- 1.00
- 1.20

13. You're running a series of experiments, and you determine that the results of the first experiment changes the probabilities of the potential outcomes in the second experiment. How would you describe these experiments?

- Independent
- Dependent
- Mutually Inclusive
- Mutually Exclusive

14. You've sampled 20 units from the last production lot and found that 3 of them are non-conforming. Find the 95% confidence interval for the true population proportion of defective products.

- $-0.070 < p < 0.229$
- $0.000 < p < 0.306$
- $-0.006 < p < 0.306$
- $0.018 < p < 0.282$

15. **You're comparing two population variances against each other using the F-distribution. You take 6 samples from each population, and you're performing a right-handed hypothesis test at 10% significance level. What is the critical value of this test?**
    - 3.055
    - 3.453
    - 3.405
    - 3.108

16. **You're constructing an NP chart, where you've sampled from 18 subgroups, each with 30 samples, and found a total of 169 defective units. Calculate the lower control limit for this process.**
    - 0
    - 6.85
    - 1.77
    - 17.0

Completion! *(Congrats)* Finish Time: _____