

**QUESTIONS:**

- 1. Which value of the normal distribution is a measure of the central tendency & often exists at the peak & centerline of the distribution?**
  - Mean
  - Range
  - Standard Deviation
  - Variance
  
- 2. A supplier is attempting to win more business from your organization, and they recognize you as a key stakeholder who can speak up regarding the quality of their product. They offer you expensive tickets to a football game where your favorite team happens to be playing in. What element of the code of ethics might be in violation here?**
  - Act with Integrity and Honesty
  - Demonstrate Responsibility, Respect and Fairness
  - Safeguard Proprietary Information
  - Avoid Conflict of Interests
  
- 3. You manufacture a component whose critical feature follows the normal distribution with a mean value of 5.0, and a standard deviation of 0.25. What is the Z-score associated with the outcome of 4.75?**
  - 1.0
  - 0.33
  - -1.0
  - -0.5
  
- 4. You're trying to implement 5S into your operation, and you travel to another facility within your organization to learn how they implemented 5S. What are you engaged in?**
  - PDCA
  - Six Sigma
  - Brainstorming
  - Benchmarking

5. Fill in the blank: \_\_\_\_\_ is a measure of the location of the mode in relationship to the mean when data is normally distributed.
- Kurtosis
  - The Mean Value
  - The Median Value
  - Skewness
6. You have a shared resource that must be changed-over frequently. You're performing an analysis and you notice that the employees are constantly walking to different locations to get the necessary change-over tools. This represents which form of waste?
- Motion
  - Transportation
  - Waiting
  - Extra-processing
7. You manufacture a component whose critical feature follows the normal distribution with a mean value of 10, and a variance of 4. What is the Z-score associated with the outcome of 12?
- 0.5
  - 1.0
  - 1.5
  - 2.0
8. How many treatments would be required for a DOE with 5 factors, and 2 levels, where a full factorial design is chosen?
- 25
  - 16
  - 32
  - 10

9. Fill in the Blank: \_\_\_\_\_ is defined as a total set of objects, events or observations about which you want to study.

- A Sample
- A Population
- The Sample Mean
- The Population Mean

10. Let's say you're dealing with a random variable  $X$  that follows a normal distribution. What is the probability that  $Z$  will be less than 1.22?

- 11.13%
- 38.87%
- 88.87%
- 62.13%

**SOLUTIONS:**

1. Which value of the normal distribution is a measure of the **central tendency** & often exists at the **peak & centerline of the distribution**?
  - Mean
  - Range
  - Standard Deviation
  - Variance
2. A supplier is **attempting to win more business from your organization**, and they recognize you as a key stakeholder who can speak up regarding the quality of their product. They **offer you expensive tickets** to a football game where **your favorite team** happens to be playing in. What element of the code of ethics might be in violation here?
  - Act with Integrity and Honesty
  - Demonstrate Responsibility, Respect and Fairness
  - Safeguard Proprietary Information
  - **Avoid Conflict of Interests**
3. You manufacture a component whose critical feature follows the **normal distribution** with a **mean value of 5.0**, and a **standard deviation of 0.25**. What is the **Z-score** associated with the **outcome of 4.75**?
  - 1.0
  - 0.33
  - **-1.0**
  - -0.5

$$Z = \frac{X - \mu}{\sigma} = \frac{4.75 - 5}{0.25} = -1.0$$

4. You're trying to implement 5S into your operation, and **you travel to another facility** within your organization **to learn how they implemented** 5S. What are you engaged in?
  - PDCA
  - Six Sigma
  - Brainstorming
  - **Benchmarking**

5. Fill in the blank: \_\_\_\_\_ is a measure of the location of the mode in relationship to the mean when data is normally distributed.

- Kurtosis
- The Mean Value
- The Median Value
- **Skewness**

6. You have a shared resource that must be changed-over frequently. You're performing an analysis and you notice that the employees are constantly walking to different locations to get the necessary change-over tools. This represents which form of waste?

- **Motion**
- Transportation
- Waiting
- Extra-processing

7. You manufacture a component whose critical feature follows the normal distribution with a mean value of 10, and a variance of 4. What is the Z-score associated with the outcome of 12?

- 0.5
- **1.0**
- 1.5
- 2.0

$$Z = \frac{X - \mu}{\sigma} = \frac{12 - 10}{2} = 1.0$$

**Note:** We're given the variance ( $\sigma^2 = 4$ ). To find the standard deviation ( $\sigma$ ) we should simply take the square root of variance ( $\sigma = 2$ ).

8. How many treatments would be required for a DOE with 5 factors, and 2 levels, where a full factorial design is chosen?

- 25
- 16
- **32**
- 10

Full Factorial Design:  $Number\ of\ Treatments = Levels^{Factors} = 2^5 = 32$

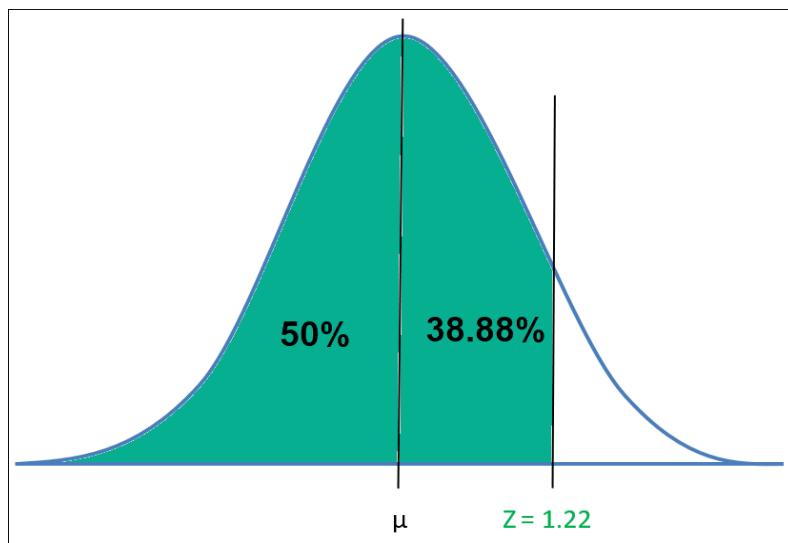
9. Fill in the Blank: \_\_\_\_\_ is defined as a **total set of objects, events or observations** about which you want to study.

- A Sample
- **A Population**
- The Sample Mean
- The Population Mean

10. Let's say you're dealing with a random variable X that follows a **normal distribution**. What is the probability that **Z will be less than 1.22**?

- 11.13%
- 38.87%
- **88.87%**
- 62.13%

<b>Area under the Normal Curve from 0 to X</b>								
<b>X</b>	<b>0.00</b>	<b>0.01</b>	<b>0.02</b>	<b>0.03</b>	<b>0.04</b>	<b>0.05</b>	<b>0.06</b>	<b>0.07</b>
<b>0.0</b>	0.00000	0.00399	0.00798	0.01197	0.01595	0.01994	0.02392	0.02790
<b>0.9</b>	0.31594	0.31859	0.32121	0.32381	0.32639	0.32894	0.33147	0.33398
<b>1.0</b>	0.34134	0.34375	0.34614	0.34849	0.35083	0.35314	0.35543	0.35769
<b>1.1</b>	0.36433	0.36650	0.36864	0.37076	0.37286	0.37493	0.37698	0.37900
<b>1.2</b>	0.38493	0.38699	<b>0.38877</b>	0.39065	0.39251	0.39435	0.39617	0.39796



We must find the area to the **left of  $z = 1.22$** , which is  $50\% + 38.8\% = \mathbf{88.87\%}$