

King Fahd University of Petroleum & Minerals

CEM 515: PROJECT QUALITY MANAGEMENT

Exercises for Statistical Process Control

1. A process which is in statistical control will.
 - a. Produce product to specification.
 - b. Consistently produce product which, when charted, will fall within statistical controls limits.
 - c. Both on the above

2. You are plotting a control chart and the last two of three parts are greater than 2 , four out of the last five point are beyond readings are beyond 1 σ and eight successive points are on one side of the center line ; you should
 - a. Stop the process immediately.
 - b. Take more
 - c. Do nothing since no piece was out of spec limit
 - d. Write discrepancy notice to the supervisor
 - e. Investigate to determine what has changed

3. A normal (Gaussian) distribution curve is:
 - a. Bell shaped
 - b. Dome Shaped
 - c. Pear Shaped
 - d. Positive Shape

4. A control Chart issued for the primary purpose of:
 - a. Setting specifications and tolerances
 - b. Comparing operations
 - c. Determining the stability of a process
 - d. Accepting or rejecting a lot of material

5. The tabulation of the number of times a given quality characteristic measurement occurs, within the sample of product being checked is called a :
 - a. Histogram
 - b. Normal distribution
 - c. Control Chart
 - d. Random Function

6. What is the mean height of five men who have the following heights?
5' 6"; 5' 9"; 54'; 511", 5'8:
- a. 6'0"
 - b. 5'5"
 - c. 5'6 1/2"
 - d. 5'7 3/5"
7. Calculate the standard deviation of the population for the following set of five sample observation:
1.5, 1.2, 1.1, 1.0, 1.6
- a. 1.280
 - b. 0.259
 - c. 0.231
 - d. 0.518
8. Approximately what percentage of the area under the normal curve is included within 3 standards deviation from the mistake?
- a. 50.0 %
 - b. 68.0 %
 - c. 90.0 %
 - d. 99.7 %
9. Variance is:
- a. The difference between actual and assumed values
 - b. Equal to 1.0 in most normal distributions
 - c. The square root of the standard deviation
 - d. The square of the standard deviation
 - e. The standard error of the mean
10. What is the upper control limit for p' (proportion defective) when the average daily production is 2500. Units with an established fraction defective of 0.05?
- a. 0.054
 - b. 0.058
 - c. 0.063
 - d. 0.066
 - e. 0.159
11. What is the value of the median for the following set of readings?
1.0,3.0,3.5,4.0,4.5,5.0,5.5
- a. 4.00
 - b. 5.00
 - c. 4.50

- d. 3.50
 - e. 4.25
12. Question was deleted intentionally
13. Calculate the standard deviation of the following set of five sample observations:
1.5, 1.2, 1.1, 1.0, 0
- a. 0.756
 - b. 0.858
 - c. 0.568
 - d. 0.500
14. Which one of the following best describes machine capability?
- a. The total variation of all activities of a mold, cavities of a die cast machine or spindles of an automatic assembly line.
 - b. The inherent variation of the machine
 - c. The total variation over a shift.
 - d. The variation in a short run of consecutively produced parts
15. For the normal probability distribution, the relationships among the median, mean and mode are that:
- a. They are all equal to the same value
 - b. The mean and mode have the same value but the median is different
 - c. Each has a value different from the other two
 - d. The mean and median are the same but the mode is different
16. What is the standard deviation of the following sample? 3.2, 3.1, 3.3, 3.3, 3.1:
- a. 3.2
 - b. 0.0894
 - c. 0.1
 - d. 0.0498
 - e. 0.2
17. The spread of individual observations from a normal process capability distribution may be expressed numerically as:
- a. $6R/d_2$
 - b. $2xA_2R$
 - c. R/d_2
 - d. D_4

18. The expression $p(x) = \frac{(u^x - e^{-u})}{x!}$
- a. Poisson distribution
 - b. Pascal distribution
 - c. Hyper geometric distribution
 - d. Binomial distribution
19. Question Deleted Intentionally
20. A number derived from sample data, which describes the data in some useful way,
- a. Constant
 - b. Statistic
 - c. Parameter
 - d. Critical value
21. Machine capacity studies on four machines yielded the following information:

<u>Machine</u>	<u>Average (X)</u>	<u>Capability(6a)</u>
#1	1.495	.004"
#2	1.502	.006"
#3	1.500	.012"
#4	1.498	.012"

The tolerance on the particular dimension is $1.500 \pm .005$. If the average value can be readily shifted by adjustment to the machine, then the *best* machine to use is:

- a. Machine #1
 - b. Machine #2
 - c. Machine #3
 - d. Machine #4
22. Question Deleted Intentionally
23. Question Deleted Intentionally

24. The prime use of a control chart is to:
- Detect assignable causes of variation in the process
 - Detect non conforming product
 - Measure the performance of all quality characteristics of process
 - Detect the presence of random variation in the process
25. A process is in control at $\bar{X} = 100$ $\bar{R} = 7.3$ with $n=4$. If the process level shifts to 101.5 with the same R , what is the probability that the next \bar{X} -bar point will fall outside the control limits.
- .016
 - .029
 - .122
 - .360
26. What value of Z in the normal tables has 5% of the area in the tail beyond it?
- 1.960
 - 1.645
 - 2.576
 - 1.282
27. An \bar{X} -bar and R chart was prepared for an operation using twenty samples with five pieces in each sample \bar{X} -bar was found to be 33.6 and \bar{R} -bar was 6.20. During production, a sample of five was taken and the pieces measured 36, 43, 37, 25, and 38. At the time, this sample was taken:
- Both average and range were within control limits
 - Neither average nor range were within control limits
 - Only average was outside control limits
 - Only the range was outside control limits