

## Six Sigma Certification Exam Questions with Answers

(Based on ASQ Black Belt BOK DMAIC sections)

### ANALYZE

1) At a six sigma training session a black belt candidate was asked to interpret the correlation coefficient (r) of -0.9 between absenteeism and performance evaluation scores at an engineering department. Which is the correct interpretation that she needs to choose?

- a) Absenteeism causes low performance scores
- b) There is no connection between performance scores and absenteeism
- c) There is a strong inverse association between two variables
- d) A confounding variable causes absenteeism drop as the performance scores increase

***A negative “r” suggests a negative or inverse variable association and -0.9 suggests a strong relationship. Hence c) is correct. Correlation does not meet causation. This is why a) is incorrect. -0.9 suggests a strong relationship between variables so b) is incorrect. d) is incorrect as there is no way of knowing anything about a confounding variable from the presented information.***

2) At a lean six sigma certification test, a LSS black belt candidate correctly answered that Type I error occurs when \_\_\_\_\_.

- a) The null hypothesis is rejected when it is true
- b) The null hypothesis is not rejected when it is false
- c) The alternative hypothesis is accepted when it is false
- d) The alternative hypothesis is rejected when it is false

***Only a) is correct as it describes Type I error. Answer c) seems to be “almost” correct, but we never accept hypotheses. We either reject or fail to reject hypothesis.***

3) At a Motorola factory, a process improvement team consisting of a black belt and three green belts identified 5 main defect types responsible for faulty cell phones and plotted them on a \_\_\_\_\_ . In a sample of 120 phones 50% of defects were due to defective antennas, 30% due to chip malfunctioning, 10% due to broken screens, 8% due to external cracks and the rest of the defect types accounted for the remaining 2%. In order to target “vital few”, the team decided to focus its efforts on antennas and chips which accounted for cumulative 80% of overall defects.

- a) Scatter diagram
- b) Defects plot
- c) Cumulative chart
- d) Pareto chart

***The question alludes to the team's focus on identifying the "vital few" defect types which account for a large portion of cell phone defectiveness. This is in line with Pareto principle of 80/20 according to which 20% of factors cause 80% of outcomes. In this question although antennas and chips represent only 2 types of defects, they account for 80% of defects. The team was likely to use the Pareto Chart to plot the defect types and determine their percentage share in the overall cell phone defectiveness. Scatter diagram would not be appropriate to use. Answers b) and c) are made up.***

4) A lean six sigma training provider - "Six Sigma Certification Online" - commissioned a multi-vari study to analyze caller waiting time in its 4 training centers. The study found that caller waiting times did not vary from center to center as well as within centers during operation hours (9 am to 5 pm). The largest variance was found between days of the week, with Mondays having the longest caller waiting time. Which is responsible for the greatest variance?

- a) Cyclical variation
- b) Multi-various cycle
- c) Positional variation
- d) Temporal variation

***The only variation present in this situation is day-to-day (change over time), which is referred as temporal variation. Cyclical variation accounts for part-to-part variation (center to center). Positional variation refers to within-part variation (within centers during operation hours). There is no such thing as "multi-various" cycle.***

5) During the analyze phase of a six sigma project master black belt needs to perform hypothesis testing by comparing the means of two samples which may or may not be drawn from a normally distributed data. He decides not to risk and substitute 2 sample t-test with a corresponding nonparametric test. Which test should he choose?

- a) Lavene's test
- b) Mann-Whitney test
- c) Z-test
- d) Contingency tables

***Mann-Whitney test is the right answer as it is used to substitute for 2 sample t-test. Lavene's test is used for 2 population standard deviation comparison and is not correct. Z-test is a parametric test. Contingency tables are used determine whether items classified into two or more categories act independent of each other and is incorrect.***