Unit 7 - Week 5

Assignment 5

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-03-04, 23:59 IST.

1) In any control chart, two types of error namely Type-I error and Type-II error may occur. If Type-I error is more, Type II error may be *2 points*

a. More than Type-I error
b. Less than Type-I error
c. Equal to Type-I error
d. None of the above

- a.
- b.
- c.
- d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

2) A Shewhart control chart is recommended to be used under a given condition. Out of the following four conditions mentioned, identify the correct one *2 points*

a. The process is of special type requiring the use of new technology for process control
b. The process is an automated one
c. The process is of general type with manual control and not sophisticated
d. The process is a sophisticated one with a very small shift in its process parameter value is not permitted

- a.
- b.
- c.
- d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

3) In one of the following control charts, the control limits are not parallel to the horizontal axis. Identify it *2 points*

a. Moving average control chart
b. Regression control chart
c. MR control chart
d. Cumulative sum control chart

- a.
- b.
- c.
- d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

4) A mixture pattern is considered a systematic one and hence not a natural pattern. The main reason of getting such a pattern is *2 points*

a. Measurement error while collecting the data
b. The process is highly controlled
c. Principles of rational subgrouping are not followed
d. None of the above

- a.
- b.
- c.
- d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

5) A control chart for controlling demerits per unit is recommended when a set of certain conditions are fulfilled. Among the following four sets of conditions stated, only one set of conditions are to be met. Indicate that set. *2 points*

a. Demerits per unit is Poisson distributed and weightages vary from one type of defect to another
b. Demerits per unit is Poisson distributed and the types of defects are having the same weightage
c. Demerits per unit is Binomially distributed and the types of defects are having different weightages
d. Demerits per unit is Normally distributed and the types of defects are having the same weightage

- a.
- b.
- c.
- d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

6) The amount of cement placed in a bag is specified as 50±0.25 lb. Twenty random samples of five bags each are taken, with $\overline{X}$ and R values as shown in the table below. In this table, data are coded by subtracting 50 lb. Construct a modified control chart with 3-sigma limits. If the true process fraction nonconforming is as large as 1%, the process is unacceptable. Find the control limits and also state if the process is within control or not (D_4=2.114, D_3=0, d_2=2.236, $Z_{0.01}$=2.33) *2 points*

Sample Number	$\overline{X}$	R
1	0.0771	0.0673
2	-0.0442	0.0730
3	-0.1037	0.0751
4	-0.0191	0.0607
5	0.0783	0.0674
6	-0.0299	0.0926
7	0.0762	0.1101
8	-0.0075	0.0723
9	-0.1209	0.0647
10	-0.0642	0.1093
11	0.0340	0.0710
12	-0.1363	0.0790
13	-0.0509	0.1070
14	0.0585	0.0786
15	-0.0915	0.0717
16	0.0513	0.0802
17	-0.0630	0.1043
18	-0.0527	0.0668
19	-0.0599	0.0403
20	-0.0501	0.0690

a. (-0.2168, 0.2168), The process is not within control
b. (-0.1286, 0.1286), The process is within control
c. (-0.2168, 0.2168), The process is within control
d. (-0.1286, 0.1286), The process is not within control

- a.
- b.
- c.
- d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

7) Consider the data in the question number 6. Suppose that if the true process fraction nonconforming is as large as 5%, it is important to detect this out-of-control condition with a probability of 0.90. Find the control limits and also state if the process is within control or not ($Z_{0.05}$=1.645 and $Z_{0.01}$=1.28, d_2=2.326) *2 points*

a. (-0.1756, 0.1756), The process is with in control
b. (-0.2168, 0.2168), The process is with in control
c. (-0.2168, 0.2168), The process is not with in control
d. (-0.1756, 0.1756), The process is not with in control

- a.
- b.
- c.
- d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

8) Twenty five samples of size 50 are chosen from a plastic-injection molding machine producing small containers. The number of nonconforming container for each sample is shown in the table below. Determine the modified control limits for p-chart assuming that special causes for the out-of-control points are identified. Construct an OC curve as a function of the process average nonconforming and determine the probability of Type-II error for p=0.10, 0.20, 0.40 *2 points*

Sample	Number of nonconforming items
1	4
2	2
3	5
4	3
5	2
6	1
7	3
8	2
9	5
10	4
11	3
12	5
13	5
14	2
15	3
16	2
17	4
18	10
19	4
20	3
21	2
22	5
23	4
24	3
25	4

a. (0, 0.173), 0.925, 0.333, 0.002
b. (0, 0.182), 0.866, 0.212, 0.111
c. (0, 0.128), 0.111, 0.212, 0.866
d. (0, 0.137), 0.222, 0.333, 0.925

- a.
- b.
- c.
- d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

9) The number of imperfections in bond paper produced by a paper mill is observed over a period of several days. The table below shows the area inspected and the number of imperfections for 25 samples. Construct a control chart for the number of imperfections per square meter. Determine the revised limits for each of subgroup size 100 and 200, assuming special causes for the out-of-control points. *2 points*

Sample	Area Inspected, m^2	Imperfections
1	150	6
2	100	8
3	200	5
4	150	4
5	250	10
6	100	11
7	150	3
8	200	5
9	300	10
10	250	10
11	100	5
12	200	4
13	250	12
14	300	8
15	300	12
16	200	6
17	150	4
18	200	7
19	150	14
20	100	4
21	100	8
22	200	9
23	300	12
24	250	7
25	200	5

a. (0.0756,0), (0.0922,0)
b. (0.756, 0), (0.922,0)
c. (0.0922,0), (0.0756,0)
d. (0.922, 0), (0.756, 0)

- a.
- b.
- c.
- d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

10) Samples of fabric from a textile mill, each 100 m^2, are selected, and the numbers of occurrences of foreign matter are recorded. Data for 25 samples are shown in the table below. Construct a c-chart for the number of nonconformities. *2 points*

(i) Determine modified UCL and LCL for a c-chart

(ii) Determine the probability of making Type-II error against c=1, c=10, and c=20

Sample	Nonconformities
1	5
2	4
3	7
4	6
5	8
6	5
7	6
8	5
9	16
10	10
11	9
12	7
13	8
14	11
15	9
16	5
17	7
18	6
19	10
20	8
21	9
22	9
23	7
24	5
25	7

a. (8.262,0), 0.932, 0.631, 0.571
b. (15.262,0), 0.632, 0.951, 0.157
c. (8.262,0), 0.571, 0.631, 0.932
d. (15.262,0), 0.157, 0.951, 0.632

- a.
- b.
- c.
- d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.