Problem 6s.18

Question Help

Five data entry operators work at the data processing department of the Birmingham Bank. Each day for 30 days, the number of defective records in a sample of 250 records typed by these operators has been noted, as follows:

Sample No.	No. Defectives	Sample No.	No. Defectives	Sample No.	No. Defectives
1	7	11	7	21	18
2	4	12	6	22	13
3	20	13	17	23	7
4	10	14	5	24	8
5	12	15	11	25	14
6	9	16	8	26	9
7	12	17	13	27	13
8	10	18	4	28	5
9	5	19	17	29	12
10	13	20	16	30	2

a) Establish 3σ upper and lower control limits.

UCL_p = 0.078 *(enter your response as a number between 0 and 1, rounded to three decimal places).*

LCL_p = 0.003 *(enter your response as a number between 0 and 1, rounded to three decimal places).*

b) Why can the lower control limit not be a negative number?

- A. Since the percent of defective records is always a positive number.
- B. Since the upper control limit cannot be a negative number.
- ✔ C. Since the percent of defective records cannot be a negative number.
- D. Since the upper control limit is positive.

c) The industry standard for the upper control limit is 0.10. What does this imply about Birmingham Bank's own standards?

The industry standard is not as strict as the standard at Birmingham Bank.

Sample	# Defectives (np)	sample size n	fraction of defective(p=np/n)
1	7	250	0.028
2	4	250	0.016
3	20	250	0.08
4	10	250	0.04
5	12	250	0.048
6	9	250	0.036
7	12	250	0.048
8	10	250	0.04
9	5	250	0.02
10	13	250	0.052
11	7	250	0.028
12	6	250	0.024
13	17	250	0.068
14	5	250	0.02
15	11	250	0.044
16	8	250	0.032
17	13	250	0.052
18	4	250	0.016
19	17	250	0.068
20	16	250	0.064
21	18	250	0.072
22	13	250	0.052
23	7	250	0.028
24	8	250	0.032
25	14	250	0.056
26	9	250	0.036
27	13	250	0.052
28	5	250	0.02
29	12	250	0.048
30	2	250	0.008
TOTAL	**307**	**7500**	**1.228**
average	10.2333	250.0000	**0.0409**
upper control	**0.078**	0.0409+3*SQRT(((0.0409)*(1-0.0409))/250)=**0.078**	
lower control	**0.003**	0.0409-3*SQRT(((0.0409)*(1-0.0409))/250)=**0.03**	

Problem 6s.31 (additional/static)

Question Help

Refer to the table Factors for Computing Control Chart Limits (3 sigma) for this problem.

Pet Products, Inc., caters to the growing market for cat supplies, with a full line of products ranging from litter to toys to flea powder. One of its newer products, a tube of fluid that prevents hairballs in long-haired cats, is produced by an automated machine set to fill each tube with 63.5 grams of paste.

To keep this filling process under control, four tubes are pulled randomly from the assembly line every 4 hours. After several days, the data shown in the table that follows resulted.

Sample	$\bar{x}$	R	Sample	$\bar{x}$	R	Sample	$\bar{x}$	R
1	63.5	2.0	10	63.5	1.3	19	63.8	1.3
2	63.6	1.0	11	63.3	1.8	20	63.5	1.6
3	63.7	1.7	12	63.2	1.0	21	63.9	1.0
4	63.9	0.9	13	63.6	1.8	22	63.2	1.8
5	63.4	1.2	14	63.3	1.5	23	63.3	1.7
6	63.0	1.6	15	63.4	1.7	24	64.0	2.0
7	63.2	1.8	16	63.4	1.4	25	63.4	1.5
8	63.3	1.3	17	63.5	1.1			
9	63.7	1.6	18	63.6	1.8			

Set control limits for this process for the $\bar{x}$-chart.

$UCL_{\bar{x}}$ = 64.58 grams *(round your response to two decimal places).*

$LCL_{\bar{x}}$ = 62.40 grams *(round your response to two decimal places).*

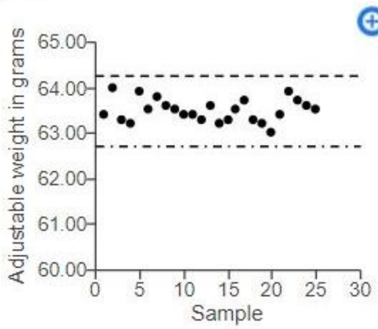
$UCL_R = D_4\bar{R}$

$LCL_R = D_3\bar{R}$

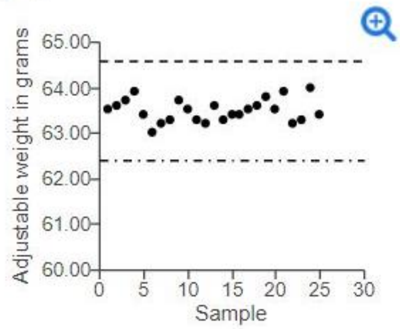
average	**63.488**	**1.496**	
x bar	**64.579**	63.488+0.729*1.496=**64.579**	
x bar	**62.397**	63.488-0.729*1.496=**62.397**	
r bar	**3.414**	2.282*1.496=**3.414**	
r bar	**0.000**	0*1.496=**0.00**	

Choose the correct graph of the sample data for the $\bar{x}$-chart.

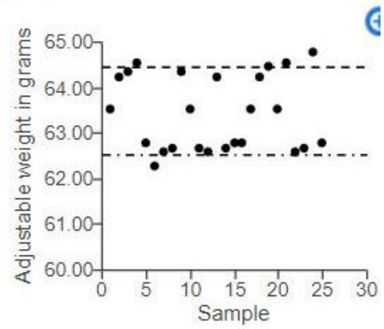
A.



B.



C.



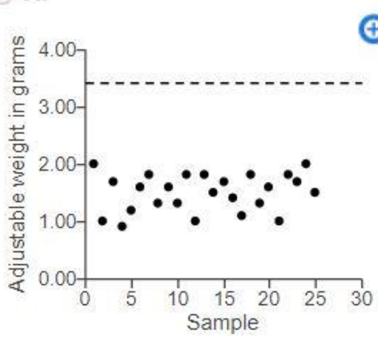
Set control limits for this process for the R-chart.

UCL_R = 3.41 grams *(round your response to two decimal places).*

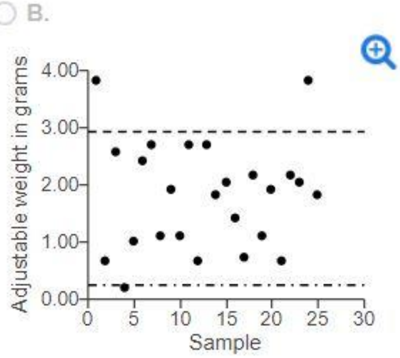
LCL_R = 0.00 grams *(round your response to two decimal places).*

Choose the correct graph of the sample data for the R-chart.

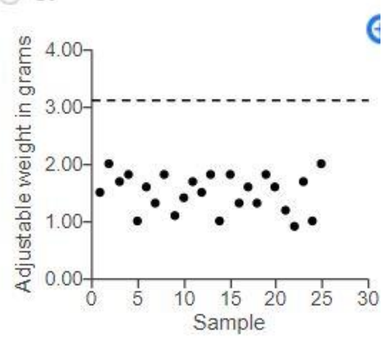
A.



B.



C.



Has the process been in control?

- Yes
- No

Problem 6s.33 (additional/static)

Question Help

Refer to the table Factors for Computing Control Chart Limits (3 sigma) for this problem.

Your supervisor, Lisa Lehmann, has asked that you report on the output of a machine on the factory floor. This machine is supposed to be producing optical lenses with a mean weight of 50 grams and a range of 3.5 grams. The following table contains the data for a sample size of n = 6 taken during the past 3 hours:

Sample	1	2	3	4	5	6	7	8	9	10
$\bar{x}$	55	47	49	50	52	57	55	48	51	56
R	3	1	5	3	2	6	3	2	2	3

Set the control limits for this process for the $\bar{x}$-chart when the machine is working properly.

$UCL_{\bar{x}}$ = 51.69 grams *(round your response to two decimal places).*

$LCL_{\bar{x}}$ = 48.31 grams *(round your response to two decimal places).*

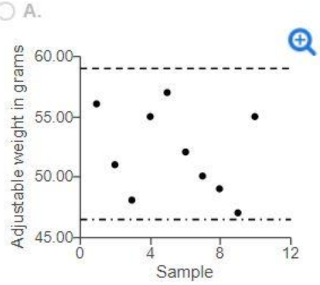
$$UCL_{\bar{x}} = \bar{\bar{X}} + A\bar{R}$$
$$LCL_{\bar{x}} = \bar{\bar{X}} - A\bar{R}$$

$$UCL_R = D_4\bar{R}$$
$$LCL_R = D_3\bar{R}$$

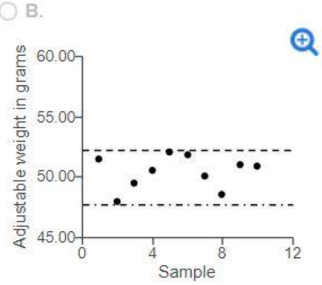
x bar	51.69	50+0.483*3.5=**51.69**
x bar	48.31	50-0.483*3.5=**48.31**
r bar	7.01	3.5*2.004=**7.01**
r bar	0.00	3.5*0=**0.00**

Choose the correct graph of the sample data for the $\bar{x}$-chart.

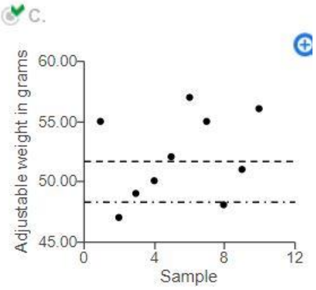
A.



B.



C.



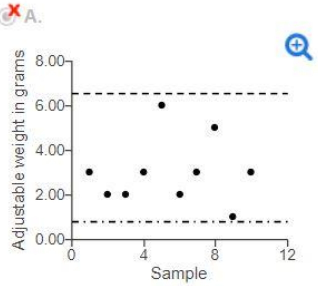
Set control limits for this process for the R-chart.

UCL_R = 7.01 grams *(round your response to two decimal places).*

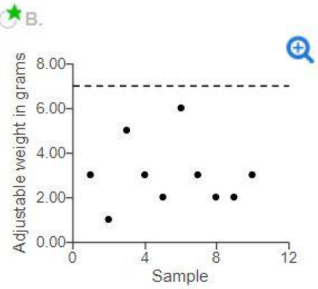
LCL_R = 0.00 grams *(round your response to two decimal places).*

Choose the correct graph of the sample data for the R-chart.

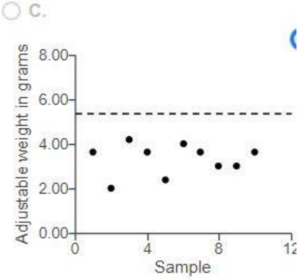
A.



B.



C.



Has the process been in control?

- No
- Yes