

IE 361 Lab#7/ Attributes Control Charts

_____ (Name)

In this lab, we're going to do some collection of attributes data and corresponding control charting. Our "production process" is going to be a "coin spinning process." That is, we're going to spin coins, and a result

the coin comes up "tails"
will be considered a "**non-conforming**" outcome.

We'll start by spinning pennies at the desks (and then go on to spinning nickels). Each attempt to spin a coin will be made on the attached data collection form laid on the desktop. A trial will be a valid trial only if the penny spins for at least 2 seconds. For each sampling period, each person in the room will spin a coin 5 times and count the number of tails. We'll add across participants to get total tails for a given sampling period. (If time were no consideration, a single person would do all of the coin spinning with a single penny and a single nickel, but some compromises must be made to get this done in a finite amount of time.)

1. Before doing any data collection, count up the number of people in the room, multiply by 5, and find $p = .5$ standards given control limits for \hat{p} based on the sample size we'll use, namely $n = 5 \times (\text{the number of participants})$.

number of participants = _____ $n =$ _____

Standards given control limits for \hat{p} are given, for example, in the table on page 107 of *SQAME*.

$CL_{\hat{p}} =$ _____ $LCL_{\hat{p}} =$ _____ $UCL_{\hat{p}} =$ _____

We'll collect data from 10 periods with the "penny process" and 5 periods with the "nickel process." Enter the numbers nonconforming (the counts of tails) below and compute the corresponding fractions nonconforming.

Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
X															
$\hat{p} = X / n$															

2. Based on the computations in 1), does it appear that a "stable process with $p = .5$ " model adequately explains the data in the table above? If there is clear evidence against this model, at which sample did it become clear that this model is inadequate? Explain.

3. Find retrospective control limits for \hat{p} in this context.

$$\hat{p}_{\text{pooled}} = \underline{\hspace{2cm}}$$

$$CL_{\hat{p}} = \underline{\hspace{2cm}} \qquad LCL_{\hat{p}} = \underline{\hspace{2cm}} \qquad UCL_{\hat{p}} = \underline{\hspace{2cm}}$$

4. Apply the limits from 3) above to the data on page 1. What do they indicate? Is there clear evidence of process instability across the 15 sampling periods? Explain.

5. Are your answers to parts 2) and 4) here consistent? Explain.

6. What does it mean if a standards given chart produces out-of-control signals, but the corresponding retrospective chart produces no signals?

7. Read carefully the discussion of "stratification" in Section 3.4 of *SQAME* (or Section 3.4 of the revision). What about the way we collected data in this exercise raises the possibility that the \hat{p} values on page 1 might be *less* variable than predicted by binomial distribution models?

8. Problem 3.27 of *SQAME* is a u chart (or c chart) problem. Find retrospective control chart limits based on the data at the top of page 120 and apply them to the data there. What is indicated about process stability?

$$CL_{\hat{u}} = CL_x = \underline{\hspace{2cm}} \quad LCL_x = \underline{\hspace{2cm}} \quad UCL_x = \underline{\hspace{2cm}}$$

Conclusion:

IE 361 Lab #7 Individual Data Collection Form

Period	Spin 1	Spin 2	Spin 3	Spin 4	Spin 5	Number of Tails
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						