

- Infection with an apparently harmless, newly recognized virus called hepatitis G, seems to interfere with HIV, slowing its progress and prolonging survival of AIDS patients, according to an Associated Press article in the September 6, 2001 edition of the Boston Globe. A study by researchers at the Iowa City Veterans Affairs Medical Center and the University of Iowa looked at 362 HIV-infected patients treated between 1988 and 1999. The researchers found that 144 of these patients were also infected with hepatitis G. Of the 144 who were infected with hepatitis G, 41 died during four years of follow-up compared with 123 of the 218 who were not infected with hepatitis G.
 - (10 points) What kind of study is this? Be as explicit as possible and justify your answer.
 - (10 points) The results look impressive. Can the experimenters conclude that infection with hepatitis G causes a reduction in the HIV mortality rate? Why or why not?
 - (10 points) If your answer to (b) was that they cannot conclude that hepatitis G causes a reduction in the HIV mortality rate, tell how you would design a study from which such a conclusion is possible.
- The questions below refer to the frequency histogram of a set of 24 data values shown in Figure 1.

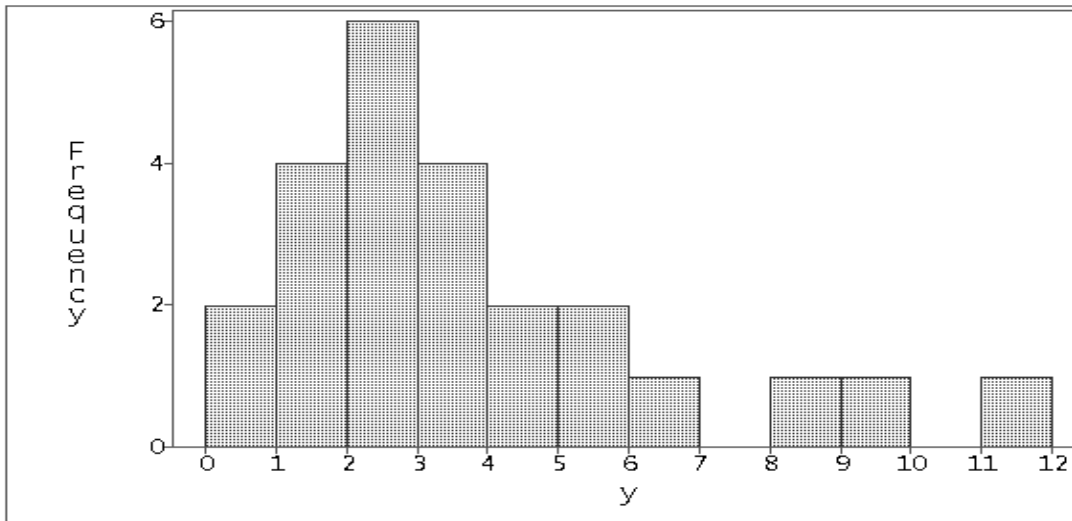


Figure 1: *Frequency histogram of 24 data values.*

- (10 points) From the histogram, obtain quartiles Q_1 , Q_2 and Q_3 of the data. Tell how you got your results. (Hint: Use the book's definitions of quartiles. Do not try to use the computational formulas.)
 - (10 points) Will the mean be greater than, equal to, or less than the median? Why?
 - (5 points) Calculate the mode, in the manner described in the text.
 - (10 points) Name one measure of location and one measure of spread that appropriately summarize the pattern of variation in these data. Why did you choose these measures?
- A manufacturer of roofing shingles wants to compare the performance of shingles with two different types of backings in field tests. To do so, they randomly select 30 communities around the country. In each, they randomly select a single-family house among those volunteered by their owners in response to an ad for a "free roof." They randomly select half the houses to receive one type of shingle and roof the rest with the second type. Various measures of the condition of each roof are obtained over a period of years.

- (a) **(10 points)** What kind of study is this? Be as specific as possible and justify your answer.
- (b) **(10 points)** Explain how blocking could be used to improve the results. Be sure to tell what the blocks are and why the blocking would be expected to improve the results.
4. **(15 points)** A gage R & R study was conducted on a weighing process. Three operators weighed a 1 pound weight five times each using the same scale. The data are (deviations, in pounds, from 1 pound):

Operator		
1	2	3
-0.007	-0.004	0.014
-0.008	0.005	0.022
-0.001	0.003	0.007
0.002	0.006	0.020
0.005	-0.001	-0.002

Assuming the data are from a stationary process, analyze the variation in the measurement process in terms of repeatability and reproducibility. Be sure to include an appropriate graph.