

Stat 31-1 First Midterm Exam

Thursday May 31, 2001

Name: \_\_\_\_\_

**Instructions:**

1. Answer all questions and **show all work** on the exam in the space provided (you may use the backs of pages if necessary). You will **not** receive credit if you do not justify your answers.
2. Please draw a **circle** or **box** around your final answers.
3. Unless otherwise specified, give exact answers.
4. Remember to sign the Honor Pledge.

I have neither given nor received any unauthorized help on this exam and I have conducted myself within the guidelines of the University Honor Code.

Pledge: \_\_\_\_\_

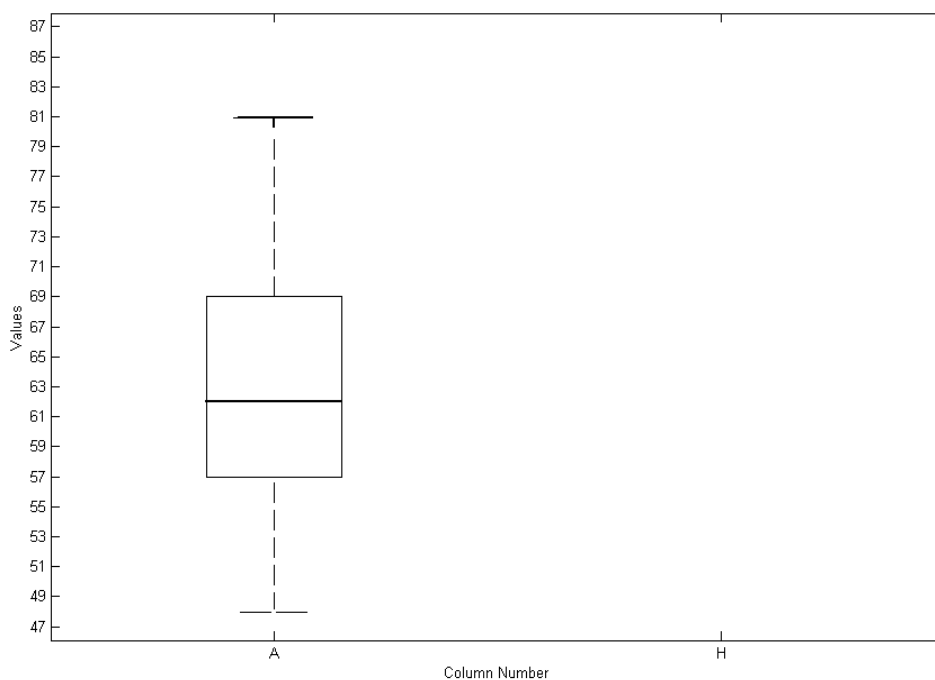
1. (35 points) The following table displays scores of Iowa College basketball team at Home (Iowa state) or Away (other state).

Home	Away
81	55
72	69
78	67
84	60
59	51
66	69
75	64
80	60
82	59
76	48
85	72
85	81

- (a) To investigate if there was a home court advantage in the "offensive game" (number of points scored) of Iowa we would like to compare the distribution of the scores of games played at Home to the scores of games played Away. Make a Back-to-Back stemplot of the data.
- (b) Describe the two distributions "Home" and "Away". According to the stemplot, was there a home court advantage for the "offensive game"?
- (c) Give the five number summary of the **Home score**.

Continued...

- (d) To further compare the two scores, we would like to see "Away" and "Home" boxplots' side-by-side. Below is the boxplot for the **Away score**, make the boxplot for the **Home score**.



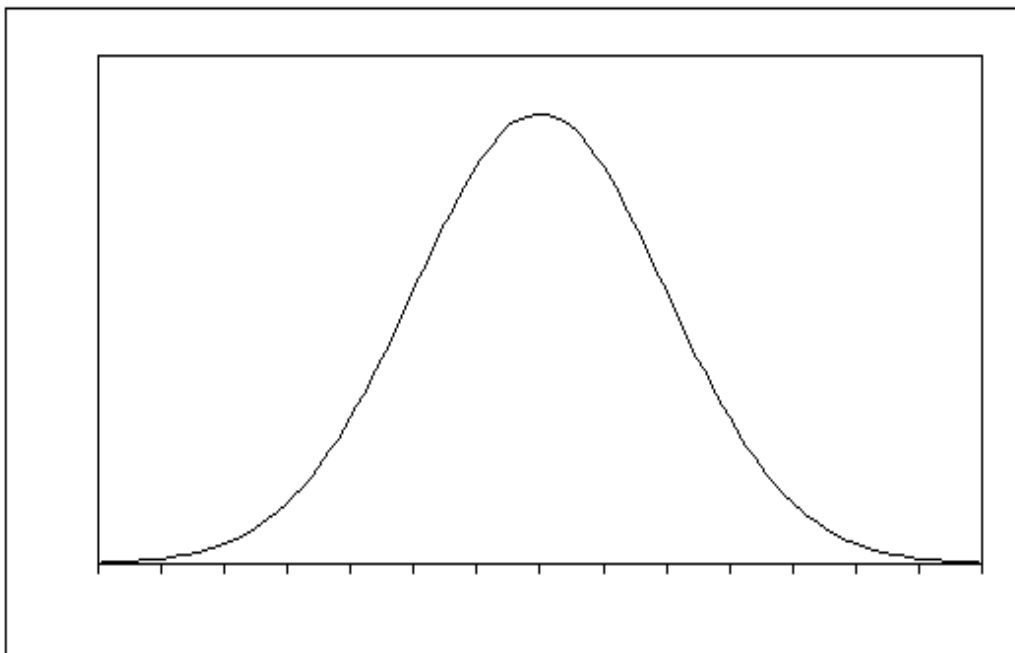
- (e) If the Home scores are in the cells B2 to B13 and the Away scores are in the cells C2 to C13. Write an Excel command that you would write in cell B15 that would give the sample mean of the **Home score**, in a form that could be "dragged to the right" to cell C15 to give the sample mean of the **Away score**.

- (f) Find the sample mean and sample standard deviation of the Home score.

Continued...

- (g) The sample Mean and sample standard deviation of **Away scores** are respectively 62.83 and 9.17. Give your estimate of the center and spread for the **Home score** and **Away score** and explain briefly your choice.

2. (20 points) The distribution of the class scores in a Statistics class was approximately normal with mean 75 and standard deviation 8.



- (a) The normal density below is the approximation to this class scores in Statistics. Label Numerically the horizontal axis, and give a brief explanation.
- (b) The Statistics teacher told three students their scores in a somewhat playful manner. She gave them the following information about their own achievements:

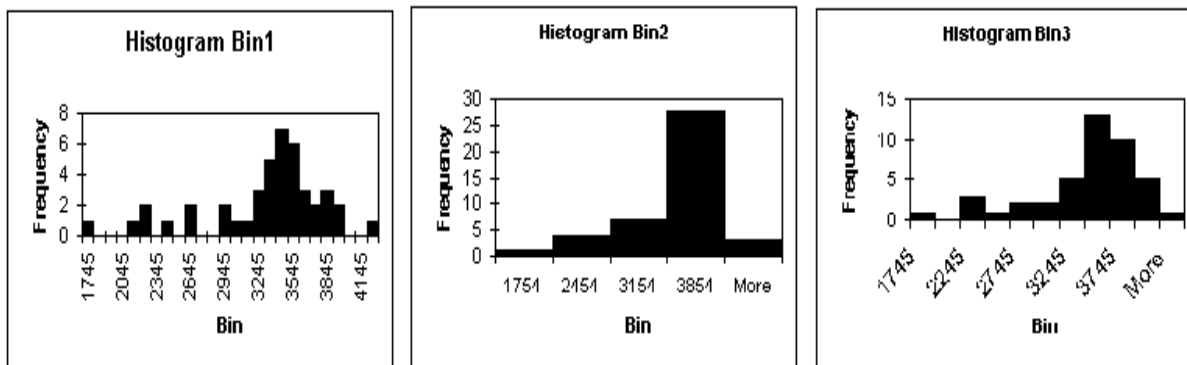
**George:** “Your raw score is 61.”

**Anna:** “Your  $z$ -score is -1.4.”

**Ethan:** “Only 10% of the class got higher scores than yours.” Fill in the missing scores in the following table.

Student's name	Raw score	$z$ -score	Percentile
George	61		
Anna		-1.4	
Ethan			90

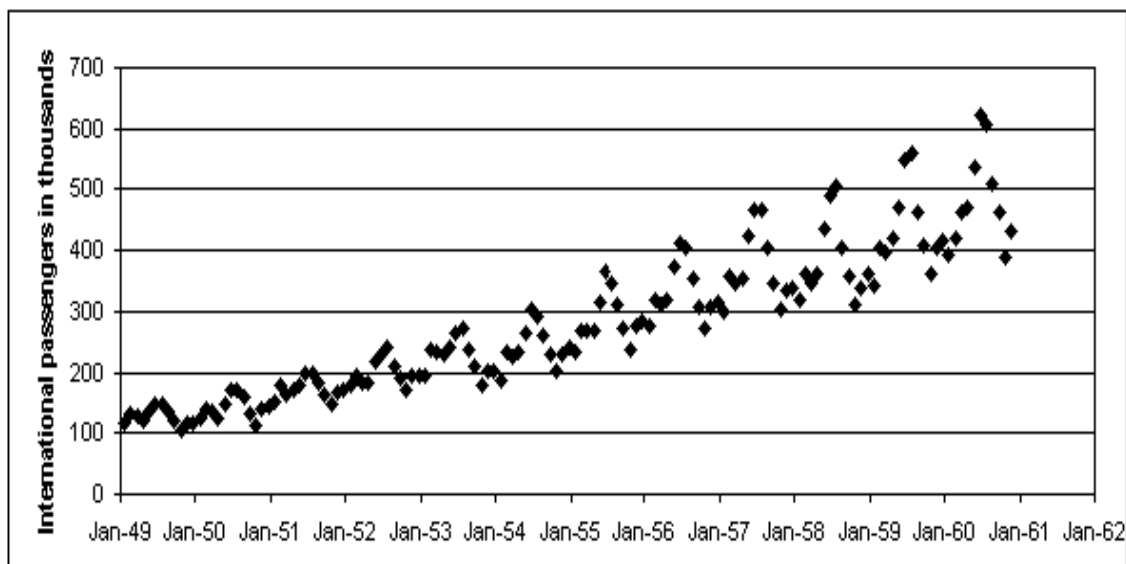
3. (15 points) A single set of data was analyzed using 3 different bin grids, and gave these histograms.



- (a) Which histogram would you use to describe the distribution in this population? Explain why?
- (b) Does the population shape seem symmetric, left skewed or right skewed? Is there any suspected outlier?
- (c) By looking at the histogram. Do you expect the median or the mean to be larger?

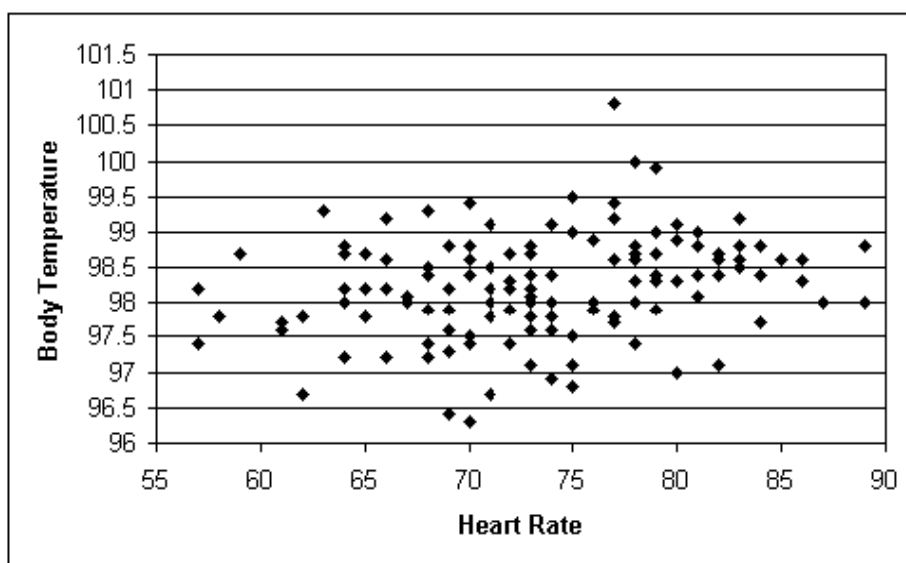
Continued...

4. (5 points) The following graph represents the monthly number of passengers in international flights from January 1949 to December 1960. Choose the correct statement
1. This plot represents a time plot with increasing trend and semiannual seasonal variation.
  2. This plot represents a time plot with increasing trend and annual seasonal variation.
  3. This plot represents a dot plot with increasing seasonal variation and annual trend.
  4. This plot represents a time plot with increasing seasonal variation and semiannual trend.



Continued...

5. (5 points) The following graph represents the heart beat (beat per minute) and the body temperature (in degrees Fahrenheit) for 130 individuals.  $r$  is the correlation of the two variables heart beat and body temperature. Choose the correct statement
1. Heart beat is a good predictor of body temperature.
  2.  $r$  is close to zero, but the correlation of the standardized heart beat and the standardized body temperature is higher.
  3.  $r = .25$  and heart beat is a bad predictor of body temperature.
  4.  $r = -.80$  which confirms the weak relationship between the two variables that we see in the graph.

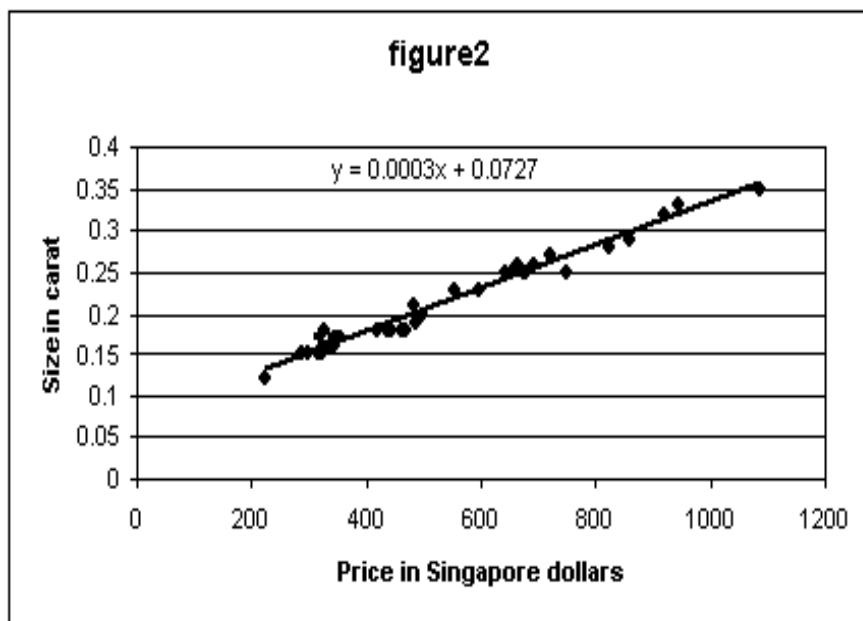
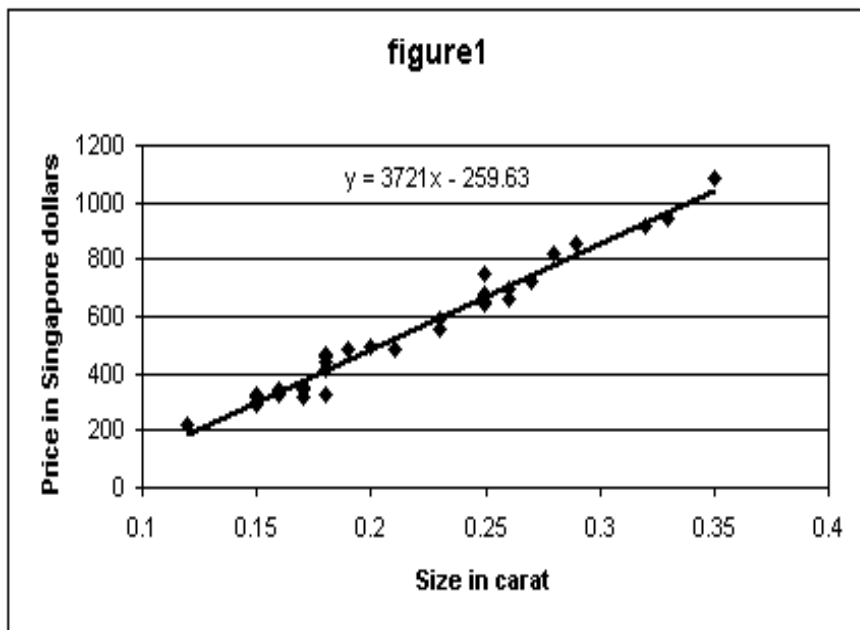


Continued...

6. (20 points) Val Entine, a Stat31 student in Singapore, would like to test her statistical skills on real data. She finds an advertisement on gold rings with a single diamond stone in the local newspaper. For 43 rings, she could read the diamond stone size and the corresponding price of the ring in Singapore dollars. Val is curious to know if there is any "mechanism" used by the jewellers to price the rings.

(a) What is the explanatory variable and what is the response in this analysis ?

(b) According to your response in a) which one of those two regression line should Val use?



Continued...

- (c) Describe the relationship between the size of the diamond stone and the price.
- (d) Write an Excel formula to find an estimate for a gold ring with a .38 carat diamond stone.
- (e) **How** would the slope change in **figure2** if the size of the diamond stones was regressed on the price of the rings in US dollars instead of Singapore dollars?  
Val tells you that 1 Singapore dollar = .545241 US dollars, so find the value of the new slope. Would the value of the intercept change too (Justify your answer)?
- (f) Val finds the value of the intercept in **figure1** counter intuitive. What do you think about it?