

HS 167 Exam 1—March 6, 2007

Name: _____

Instructions: (1) Answer questions in your blue book. *Number each response.* (2) Write your name on the cover of your blue book (and only on the cover). (3) You are allowed to use your calculator and exam packet (with formulas and tables) on this exam. (4) Time limit: 1¼ hours. (5) Each question is worth one point unless [otherwise specified].
Best of luck!

Measurement and sampling

- 1) Multiple choice [M/C]: The data in a *row* of a data table corresponds to: (a) a value (b) a variable (c) an observation.
- 2) [M/C]: The data in a *column* of a data table corresponds to: (a) a value (b) a variable (c) an observation.
- 3) Provide a synonym for the term *categorical variable*.
- 4) True or false [T/F]: A simple random sample is a sample in which every possible sample from the population has the same probability of selection.
- 5) A community survey records many variables. Which of the following variables is quantitative? (a) square footage of the house (b) monthly gas bill (c) number of residents (d) all of the above
- 6) In SPSS, the variable SEX coded F or M must be stored in this type of column: (a) numeric (b) string (c) date (d) any of the above
- 7) [T/F]: A sample in which once an individual is selected, their probability of reselection is 0, is “sampling with replacement.”
- 8) A health survey conducted by the student health service measures several variables. Which of these variables is NOT quantitative? (a) number of credit hours taken during the semester (b) gender (c) parents annual income (d) High School GPA
- 9) Which of the following variables is ordinal? (a) opinion score ranked 1 = strongly agree to 5 = strongly disagree (b) gender (c) annual income (d) HIV status
- 10) [T/F]: Statistics is merely a compilation of computational techniques.

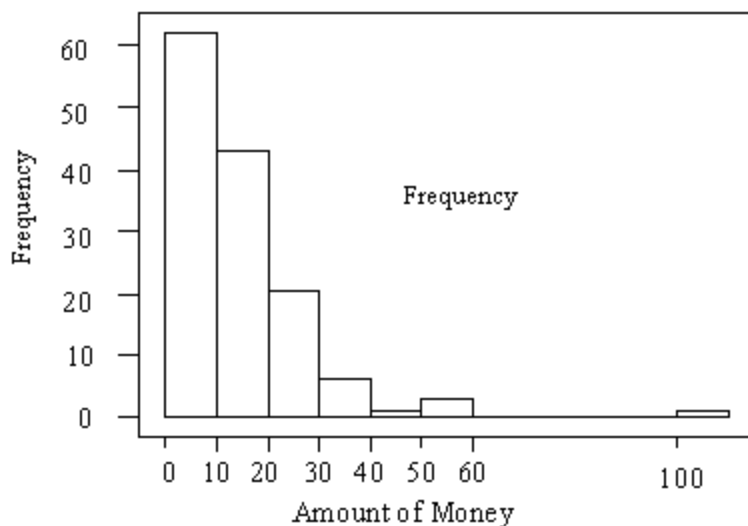
Frequency distributions and summary statistics

- 11) A distribution with a long tail toward the smaller values has this type of skew.

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- 12) This statistic locates the gravitational center of a distribution.
- 13) This term means “the proportion of individuals in a data set that is less than or equal to a given value.”
- 14) In drawing a histogram, which of the following suggestions should be followed? (a) Histograms should be used only for quantitative variables (b) The histogram bars should touch (c) “a” and “b” (d) neither “a” nor “b”
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Dataset 1: The next five questions use the following information: In a statistics class with 136 students, the professor records how much money each student has in his or her possession during the first class of the semester. The following histogram is of the data collected.



- 15) Describe the shape of this distribution.
- 16) The number of students with under 20 dollars in their possession is approximately equal to _____.
- 17) The *depth* of the median for this data set is equal to _____.
- 18) The median falls in this range of values.
- 19) Are there any outliers in this dataset?
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Dataset 2: The next series of questions address these data. The length of time a patient waits for services is an important health service consideration. Waiting times (in minutes) for 10 patients at a public health clinic are: 35, 22, 53, 5, 49, 29, 26, 31, 24, and 36.

20) Plot these points (in your blue book) on a stem that has an axis-multiplier of $\times 10$.

21) Determine the median.

22) Determine Q1.

23) Determine Q3.

24) Determine the IQR.

25) Determine the lower fence.

26) Are there any lower outside values? (If so, please identify.)

27) What point defines the bottom of the lower whisker (i.e., lower inside value)?

Here are some calculations for dataset 2:

Obs (<i>i</i>)	Value (<i>x</i>)	Deviation	Squared deviation
1	35	4	16
2	22	-9	81
3	53	22	484
4	5	-26	676
5	49	18	324
6	29	-2	4
7	26	-5	25
8	31	0	0
9	24	A	B
10	36	5	25
Sums	310	0	C

28) Calculate \bar{x} .

29) What is the value of the box labeled “A”?

30) What is the value of the box labeled “B”?

31) What is the sum of squares (“C”)?

32) What is the variance?

33) What is the standard deviation?

34) The mean and the medians are about the same in the above dataset. What does this say about the shape of the distribution?

Introduction to probability

- 35) [M/C] I roll a six-sided die 100 times and get 12 ones. The proportion of times I rolled a one is 0.12. This proportion represents the (a) the distribution of the event (b) the mean of the event (c) the variance of the event (d) approximate probability of the event
- 36) Event A has probability 0.4. What is the probability of its complement?

The next series of questions use the following background information: All human blood can be typed as O, A, B, or AB. The distribution of blood types varies a bit with race. Here are the probabilities for African Americans.

Blood Type	O	A	B	AB
Probability	.50	?	.20	.05

- 37) The probability that a person selected at random from this population has blood type A = _____.
- 38) The probability that a person selected at random from the population has a blood type OTHER THAN type O = _____.
- 39) Suppose I sample 3 people at random from this population. The number of individuals with AB blood type in this sample will be a binomial random variable with $n = 3$ and $p = \underline{\hspace{1cm}}$.
- 40) What is the probability of seeing no (zero) AB blood type individuals in the sample described in #39?

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- 41) ${}_6C_4 = ?$ [Show work.]
- 42) Suppose the prevalence of TB in a homeless population is 0.10. According to the binomial distribution, the probability of *not* being exposed in 10 random contacts in this population is 0.3487. What is the probability of being exposed at least once?
- 43) Normal distributions have which of the following properties? (a) symmetric (b) central peak at the mean (c) spread proportional to standard deviation (d) all of the above
- 44) Scores on an exam are Normally distributed with a mean of 68 and standard deviation of 9. Use the 68-95-99.7 rule to determine the percentage of scores that are above 77.

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- 45) Use your Standard Normal table to determine the area under the curve corresponding to $Z < 1.15$.
- 46) Use your Standard Normal table to determine the area under the curve corresponding to $Z > 2.28$.
- 47) $z_{.99} =$ _____

Use the following information to answer the remaining questions. Birth weights at a local hospital have a Normal distribution with mean of 110 oz. and standard deviation 15 oz.

- 48) What is the z score for a birth weight that is 135 oz?
- 49) What proportion of infants will have a birth weight of above 135 ounces?
- 50) What proportion of infants will have a birth weight between 110 oz. and 135 oz?
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HW assignment (due 3/13)

Required: There is an article linked to our course homepage. Its title is “The behavior of the sample mean,” and it is written by Jerry Dallal (2004). Read this article.

Extra credit: Write a 500 – 1000 word essay describing the concept of the sampling distributions of a mean. Identify salient features of such sampling distributions. (Do not plagiarize Dallal’s article or any other article.) Turn in your essay at the next class.