

Statistics 300

Quiz #1a

Name: _____

(1 point; 1 minute)

1. Give a short definition of statistics:

(12 points; 6 minutes)

2. Circle the correct choice in each box.

a. The combined weight (in pounds) of all the people that ride the train from New York to Boston each weekday.

Are the data ... ?

Are the data ... ?

Qualitative	Nominal	Interval
Quantitative and Discrete	Ordinal	Ratio
Quantitative and continuous		

b. The average cost (in British pounds) of all the gallons of gasoline sold in Great Britain last year.

Qualitative	Nominal	Interval
Quantitative and Discrete	Ordinal	Ratio
Quantitative and continuous		

c. The radio talk show hosts who have expressed their annoyance with a caller by telling them to "pound sand" during the last 365 days.

Qualitative	Nominal	Interval
Quantitative and Discrete	Ordinal	Ratio
Quantitative and continuous		

d. The dates on which Christmas parties were held by the staff at City dog "pounds" in the last 10 years.

Qualitative	Nominal	Interval
Quantitative and Discrete	Ordinal	Ratio
Quantitative and continuous		

e. The dress sizes worn by women known to have eaten "pound cake" at some time in the last 10 years.

Qualitative	Nominal	Interval
Quantitative and Discrete	Ordinal	Ratio
Quantitative and continuous		

f. The temperatures (°F) at which "pound cake" mixes are to be baked according to directions supplied with the mix.

Qualitative	Nominal	Interval
Quantitative and Discrete	Ordinal	Ratio
Quantitative and continuous		

(5 points; 6 minutes)

3. A polling company wants to estimate the percentage of the vote that Candidate "A" will get next week when the people in Candidate A's district go to the polls to cast votes. To make their estimate, the polling company contacts a random sample of 4,000 residents of the district and asks them three questions: (1) Did you vote in the last election? (2) Do you plan to vote in this election? (3) Who do you plan to vote for? Based on the data from their survey, the company reports the "45.3% of 2,830 likely voters say they will vote for Candidate A." The "likely voters" answered "yes" to the first two questions.

Use the information in the "story" to answer the following:

(a) What is the population of interest?

(c) What statistic was used?

(d) What was the parameter of interest?

(d) Was a census or a sample used in the work?

(e) How do you know whether a census or a sample was used?

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Quiz #2

Name: _____

(6 points, 5 minutes)

1. Circle the correct sampling plan for each situation,

a. A report says, "A random sample of SUV owners in the U.S.A. was surveyed by visiting rest stops along the interstate highways in all 50 states. A total of 4223 SUV owners agreed to answer our questions."

(Simple) Random	Systemmatic
Stratified (Random)	Cluster
Convenience	Census

b. A report says, "A sample of SUV owners in the U.S.A. was selected from vehicle registration records in each of the 50 states. In each state, a random sample of 100 SUV owners was selected."

(Simple) Random	Systemmatic
Stratified (Random)	Cluster
Convenience	Census

c. A report says, "A random sample of 4223 SUV owners in the U.S.A. was surveyed. Analysis of primary drivers found that 1392 were women over 40, 2058 were women 40 and under, 490 were men over 40 and 283 were men 40 and under."

(Simple) Random	Systemmatic
Stratified (Random)	Cluster
Convenience	Census

d. A report says, "At Yosemite National Park, the numbers of visitors that arrive in SUVs was estimated by stopping the first SUV entering the park each hour during daylight hours and counting the number of people in the vehicle."

(Simple) Random	Systemmatic
Stratified (Random)	Cluster
Convenience	Census

e. A report says, "At Yosemite National Park, the favorite activities of people in SUVs was studied by stopping randomly selected SUVs as they entered the park and asking all of the vehicle occupants which activities they like the best."

(Simple) Random	Systemmatic
Stratified (Random)	Cluster
Convenience	Census

f. A report says, "All mobile home parks in the city were studied and all of the vehicles belonging to owners of the mobile homes were examined. The study shows that 38% of all the vehicles were SUVs."

(Simple) Random	Systemmatic
Stratified (Random)	Cluster
Convenience	Census

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Quiz #2

Name: _____

(8 points, 6 minutes)

2. For each of the underlined segments in the situation below, select the appropriate statistical term from the list provided and write it in the blank next to the description or situation. Choose the term that is best connected to the underlined text in the description or situation.

Terms:	1. randomization	5. placebo
	2. replication	6. block
	3. confounding	7. experimental unit
	4. blinding	8. treatment

(a). A study included 400 men and 400 women. In each gender group, 200 were given anti-oxidants and 200 were given a fake medication that has no physical effect. Each man and each woman (and those working in the study) did not know which medication he or she was taking. Although age might have affected the responses, no effort was made to control for that factor. Medications were associated with subjects (men and women) by a procedure that ensured that each subject would have an equal chance of getting each medication.

(b). A study included 400 men and 400 women. In each gender group, 200 were given anti-oxidants and 200 were given a fake medication that has no physical effect. Each man and each woman (and those working in the study) did not know which medication he or she was taking. Although age might have affected the responses, no effort was made to control for that factor. Medications were associated with subjects (men and women) by a procedure that ensured that each subject would have an equal chance of getting each medication.

(c). A study included 400 men and 400 women. In each gender group, 200 were given anti-oxidants and 200 were given a fake medication that has no physical effect. Each man and each woman (and those working in the study) did not know which medication he or she was taking. Although age might have affected the responses, no effort was made to control for that factor. Medications were associated with subjects (men and women) by a procedure that ensured that each subject would have an equal chance of getting each medication.

(d). A study included 400 men and 400 women. In each gender group, 200 were given anti-oxidants and 200 were given a fake medication that has no physical effect. Each man and each woman (and those working in the study) did not know which medication he or she was taking. Although age might have affected the responses, no effort was made to control for that factor. Medications were associated with subjects (men and women) by a procedure that ensured that each subject would have an equal chance of getting each medication.

2. (continued)

For each of the underlined segments in the situations below, select the appropriate statistical term from the list provided and write it in the blank next to the description or situation. Choose the term that is best connected to the underlined text in the description or situation.

Terms:	1. randomization	5. placebo
	2. replication	6. block
	3. confounding	7. experimental unit
	4. blinding	8. treatment

(e). A study included 400 men and 400 women. In each gender group, 200 were given anti-oxidants and 200 were given a fake medication that has no physical effect. Each man and each woman (and those working in the study) did not know which medication he or she was taking. Although age might have affected the responses, no effort was made to control for that factor. Medications were associated with subjects (men and women) by a procedure that ensured that each subject would have an equal chance of getting each medication.

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(g). A study included 400 men and 400 women. In each gender group, 200 were given anti-oxidants and 200 were given a fake medication that has no physical effect. Each man and each woman (and those working in the study) did not know which medication he or she was taking. Although age might have affected the responses, no effort was made to control for that factor. Medications were associated with subjects (men and women) by a procedure that ensured that each subject would have an equal chance of getting each medication.

(h). A study included 400 men and 400 women. In each gender group, 200 were given anti-oxidants and 200 were given a fake medication that has no physical effect. Each man and each woman (and those working in the study) did not know which medication he or she was taking. Although age might have affected the responses, no effort was made to control for that factor. Medications were associated with subjects (men and women) by a procedure that ensured that each subject would have an equal chance of getting each medication.

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Quiz #2

Name: _____

(9 points : 8 minutes)

3. (a) Complete the columns in the "Frequency Distribution" table using the data values given below.

Frequency Distribution

Class Limits		Tally	Frequency	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
Lower	Upper					
1.1	1.5					
1.6	2.0					
2.1	2.5					
2.6	3.0					

Data: 2.82 1.94 1.52 2.51 2.02
 2.46 2.08 1.78 2.79

- (b) The value of the class width = _____
- (c) The lower class limit for class 2 = _____
- (d) The upper class limit for class 4 = _____
- (e) The boundary between class 3 and class 4 = _____

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Quiz #3

Name: _____

(6 minutes; 12 points)

1. Connect the definitions and formulas (expressions) with the appropriate statistics. There can be more than one definition and/or expression for each statistic. Put the letter for each definition or expression next to one of the given statistics.

Mean _____

a.
$$\sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

Mode _____

b. The most frequent value in a sample or population

Midrange _____

c. The most commonly used measure of variation

Median _____

d.
$$\frac{\max + \min}{2}$$

Range _____

e. The largest value minus the smallest value in a sample or a population

Standard Deviation _____

f. The value that separates the lower 50% of the data from the higher 50% of the data

Variance _____

g.
$$\frac{\sum_{i=1}^n x_i}{n}$$

h. The square of the standard deviation

i. The most commonly used measure of the center

j. The square root of the variance

k. The value in the middle after the data have been arranged in sorted order

l. The sum of the all data divided by the number of values used to make the sum

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Quiz #3

Name: _____

(6 minutes; 7 points)

- 2. For the sample of data in the box, determine the values of the seven sample statistics. Remember, you must use your calculator's special statistical functions to calculate the mean, standard deviation, and variance.**

Mean _____

Mode _____

Midrange _____

Median _____

Range _____

**Standard
Deviation** _____

Variance _____

9
14
9
14
12
10
10
11
11
12
12
15

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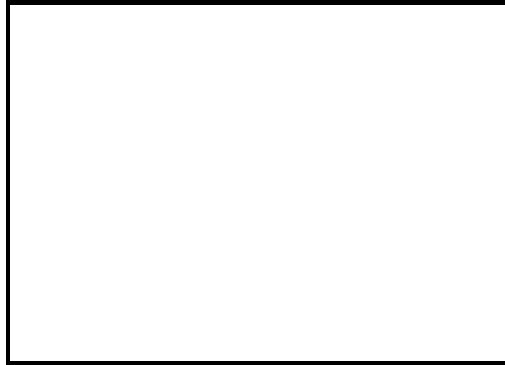
Quiz #3

Name: _____

(6 minutes; 5 points)

3. If a sample has a bell-shaped distribution for which 68% of the sample values are between 1055 and 1983, what is the approximate value of the standard deviation of the data?

(a) Draw a picture of the distribution in the box, and include any helpful information as part of the picture.



(b) Determine your approximate value for the standard deviation of the sample data.

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Quiz #4

Name: _____

(5 points; 5 minutes)

1. The heights of two professional basketball stars are compared. One is a woman who is 6 feet 2 inches tall. The other is a man who is 6 feet 10 inches tall. The population of all women who play basketball professionally has an average height (μ_w) of 5 feet 11 inches and a standard deviation (σ_w) of 2.5 inches. The population of all men who play basketball professionally has an average height (μ_m) of 6 feet 8 inches, with a standard deviation (σ_m) of 3.3 inches.

Relative to each athlete's professional peers, which athlete is taller?

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Quiz #4

Name: _____

(8 points; 8 minutes)

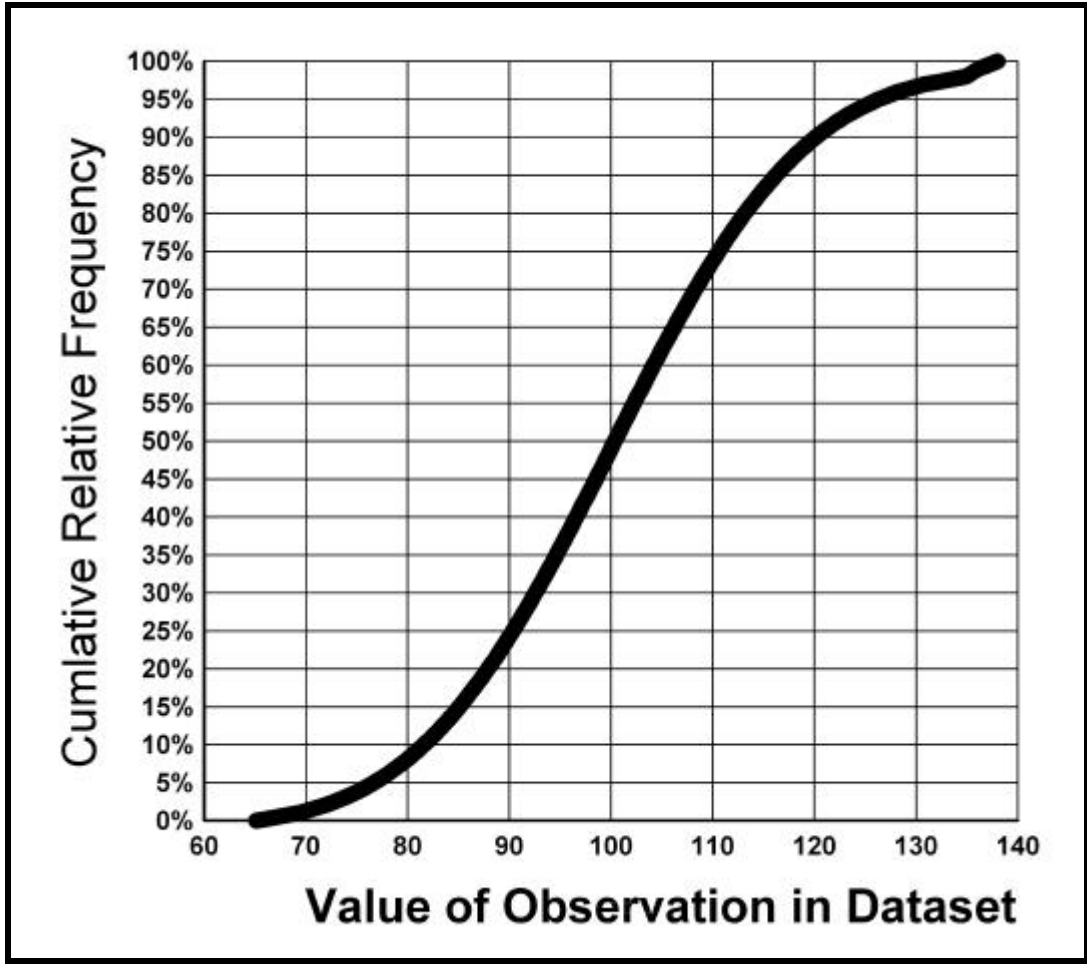
2. Based on the data set at the bottom of the page containing 80 values (8 rows of 10), answer the questions in part (a) and part (b).

(a) What percentile is represented by the value 178 ?

(b) What is the value of the 44th percentile (P_{44}) ?

101	104	106	109	113	113	115	119	119	120
123	127	127	129	132	135	136	136	136	136
138	140	144	145	147	151	152	156	156	156
157	159	160	161	163	166	169	170	172	175
176	177	178	178	178	181	182	183	184	188
192	194	195	199	200	204	208	210	211	213
216	216	220	223	226	230	230	230	230	234
238	239	241	242	243	246	246	246	249	253

Graph of the 100 values on the previous page. You can use this to help construct the required boxplot if you want to do so.



1. The customers of a particular car dealer can choose from 4 different models of car, so each customer has 4 possible choices; call them A, B, C, and D.

(3 points; 4 minutes)

- (a) Consider the choices made by the next two customers. What is the sample space for the next two choices (list the events, for example: {A,A}, but you do not need to include the braces { }). Since the choices represent different customers, {A,C} would not be the same as {C,A}.

(3 points; 3 minutes)

- (b) For your sample space (above), some of the choices are more popular with customers than are others. If you pick one of the elements in your sample space at random, what is the probability that you will pick the choice that is most popular with customers?

Name: _____

2. Based on the table on this page, answer the probability questions (a) through (d).

Coffee Choice	Vendor				Row
	A	B	C	D	Totals
Plain	130	123	138	128	519
Latte	40	53	73	58	224
Mocha	80	74	39	64	257
Column Totals	250	250	250	250	1000

(2 points; 3 minutes)

(a) What is the probability that a randomly selected person from those represented in the table will be one who buys coffee from Vendor C ?

(3 points; 3 minutes)

(b) What is the probability that a randomly selected person from those represented in the table will be one who chooses plain or latte ?

(4 points; 4 minutes)

(c) What is the probability that a randomly selected person from those represented in the table will be one who chooses mocha or one who buys coffee from Vendor B ?

(3 points; 3 minutes)

(d) What is the probability that a randomly selected person from those represented in the table will not be someone who buys lattes from Vendor A ?

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Quiz #6

Name: _____

(1 point; 2 minutes)

- 1. In the field of probability and statistics, what do we mean when we say that two events, A and B, are independent of one another?**

(4 points; 5 minutes)

- 2. If two marbles are picked at random (without replacement) from a jar that contains 5 red marbles, 4 blue marbles, and 3 black marbles, show that getting a black marble on the second pick is not independent of what happens on the first pick.**

(4 points; 5 minutes)

- 3. A system is developed to protect against missiles fired by terrorists. The system fires defensive missiles that try to intercept an incoming offensive missile. Each defensive missile has probability 0.8 of succeeding in blowing up the incoming offensive missile. If a defensive missile fails, then another defensive missile is fired. Determine the probability that the next incoming offensive missile will not be destroyed until a third missile is fired in defense against it.**

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Quiz #6

Name: _____

4. Based on this table, answer question (a).

Coffee Choice	Vendor				Row
	A	B	C	D	Totals
Plain	130	123	138	128	519
Latte	40	53	73	58	224
Mocha	80	74	39	64	257
Column Totals	250	250	250	250	1000

(3 points; 3 minutes)

(a) What is the probability that a randomly selected person from those represented in the table will be one who buys coffee from Vendor C given that the person buys a Latte?

(3 points; 3 minutes)

5. A summer camp has 36 children that are staying for two weeks. On the first day, 9 of the kids will be selected to form a baseball team. How many different teams of nine players are possible to form out of the 36 children?

(3 points; 3 minutes)

6. Reuben is one of the 36 children at the summer camp in problem #5. If the 9 kids for the baseball team are selected at random, what is the probability that Reuben gets picked to be on the team?

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Quiz #6

Name: _____

(3 points; 3 minutes)

- 7. A shoe store stocks 18 different styles of shoes. The manager of merchandizing must select 5 of the 18 styles to display from left to right in the store's main window. How many ways can the merchandizing manager pick 5 styles and display them?**

(4 points; 4 minutes)

- 8. In a very large population (treat sampling as though it was "with replacement"), what is the probability that a random sample of 6 values will include at least one that is below the 12th percentile?**

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Quiz #7

Name: _____

(3 points, 2 minutes)

1. What are the appropriate expressions (formulas) for the mean, variance, and standard deviation in the context of a discrete probability distribution?

Parameter	Expression
m	
s^2	
S	

(7 points : 7 minutes)

2. For each of the problems below (here and on next page), determine whether a valid probability distribution is described and, if so, calculate the mean, variance, and standard deviation.

- (a) A manufacturer makes a product that can have defects in 5 different ways, so some of the product will have 0 defects, some 1, 2, 3, 4, or 5 defects. The manufacturer claims that 82.8% have 0 defects, 12.8% have 1, 1.3% have 2, 0.9% have 3, 0.2% have 4, and 0.1% have 5 defects.

m = _____

s^2 = _____

S = _____

x	P(x)				

Name: _____

2. (Continued)

- (b) Use the relative frequency in the recent past as a probability distribution for the near future. Judges in an ice skating contest award scores from 1 through 6 for 288 contestants. Ten judges awarded a total of 2880 scores in the proportions listed as probabilities in the distribution below. What are the mean, variance and standard deviation of this distribution?

$\mu =$ _____

$\sigma^2 =$ _____

$\sigma =$ _____

x	P(x)				
1	0.11				
2	0.17				
3	0.21				
4	0.26				
5	0.14				
6	0.11				

(5 points : 4 minutes)

3. Larry is sitting in an airport waiting for his son's flight, which will arrive in 8 hours. Larry is bored. He will get 12 M&Ms from a candy machine. The proportion of "RED" M&Ms among all the M&Ms made is 31%. If Larry's 12 M&Ms are a random selection from the population of all M&Ms, what is the probability that his 12 M&Ms will include exactly 5 RED candies?

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Quiz #7

Name: _____

(9 points : 7 minutes)

4. (a) The percentage of "RED" M&Ms among all the M&Ms that are made is 31%. What are the mean and standard deviation for the number of RED M&Ms in randomly selected samples of 1800 M&Ms?

(b) In a random sample of 1800 M&Ms, would it be unusual to find more than 580 RED M&Ms?