ACCEPTABLE CALCULATORS: TI 30; TI 30X-A; TI 30X II-S; CASIO fx-260 Solar…

EACH TIME CELLULAR PHONES CALL MY ATTENTION, THE WHOLE CLASS LOSES FIVE POINTS (NO EXCEPTIONS)

STA 2122 SAMPLE QUESTIONS      PRINT YOUR NAME__________________________

Closed notes, closed books, no cellular phones/iphones/ipods/blackberries, etc., no calculator sharing, no computers/tablets, etc., no communication/electronic devices, no additional sheets of paper, no talking, no cheating. Most credit earned from questions comes from showing the correct procedure, correct notation, and the correct thought process to get to the answer. A correct answer with little or no supporting work is virtually worthless. An incorrect answer with correct supporting work (except with some sort of minor error) may be worth almost full credit.

[1] In each case, state whether the situation illustrates inferential or descriptive statistics
   a) In a random sample of 200 U.S. adult women (20 to 40 years old), 168 had heights between 63 and 64 inches. So, 84% of these women had heights between 63 and 64 inches; b) Eighteen percent of U.S. self-prepared tax returns have errors. This was concluded after a sample of 950 U.S. self-prepared tax returns showed that 171 had errors

[2] In each case, state whether the situation illustrates the use of a parameter or a statistic.
   a) According to the Department of Transportation, 60% of all vehicle passengers wear seat belts; b) In a sample of 49 women who served in the U.S. House of Representatives, 74% are Democrats.

[3] In each case, state whether the situation involves an experiment or an observational study.
   a) A financial researcher is interested in whether companies that give large bonuses to their CEO’s (at least $1 per year) have a higher stock price; b) To test the effectiveness of a new treatment against chronic tendinosis, a group of medical researchers administers the treatment to a sample of 50 patients with chronic tendinosis. Data on tendon thickness (in millimeters) were collected by ultrasonography before and after the treatment of each patient in order to compare the mean tendon thickness before the treatment with the mean tendon thickness after the treatment.

[4] An investigator is interested in the gender, ethnicity, GPA, number of credits completed, year-in-college classification, and career path of students at FIU. She collected information from 4 FIU students and is presented in the given table. Use this information to answer the questions

<table>
<thead>
<tr>
<th>Student</th>
<th>Gender</th>
<th>Ethnicity</th>
<th>GPA</th>
<th>Credits</th>
<th>Classification</th>
<th>Career Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amal</td>
<td>Female</td>
<td>Arab</td>
<td>3.91</td>
<td>30</td>
<td>Sophomore</td>
<td>Biology</td>
</tr>
<tr>
<td>Brian</td>
<td>Male</td>
<td>African American</td>
<td>3.89</td>
<td>69</td>
<td>Junior</td>
<td>Engineering</td>
</tr>
<tr>
<td>Nancy</td>
<td>Female</td>
<td>American</td>
<td>3.75</td>
<td>14</td>
<td>Freshman</td>
<td>Psychology</td>
</tr>
<tr>
<td>Maria</td>
<td>Female</td>
<td>Latina</td>
<td>3.90</td>
<td>45</td>
<td>Sophomore</td>
<td>Nursing</td>
</tr>
</tbody>
</table>

   a) Describe the relevant population; b) What was the observation obtained from Amal? c) Did the investigator conduct a census? Explain; d) List the elements of the study; e) List the variables; f) Which variables are quantitative? Continuous? Ordinal? Dichotomous (Binomial)?

[5] Consider the variables: a) Price of Tea; b) Course Grades (A, B, C, D, F); c) lengths of phone calls a person makes in a day; d) number of phone calls a person makes in a day; e) Temperature; h) Car manufacturers (Chevrolet, Ford, Chrysler, Toyota, Nissan, Honda…). List the qualitative variables; the discrete variables; the nominal variables; the interval variables

[6] a) Explain the difference between population and census (No examples, no diagrams...just explain); b) Explain the difference between qualitative data and quantitative data (No examples, no diagrams...just explain); …etc…

[7] a) List the five basic steps of a statistical study; b) List six reasons for sampling.
Which of the following is an example of Systematic Sampling, Stratified Sampling, Cluster Sampling, Judgment Sampling, Convenience Sampling? a) Students in a class are divided into males and females and a random sample of size three is then drawn from each of the groups; b) An Academic Dean is interested in the GPA’s of a graduating senior class. She obtains a listing of all the students at her college and records the GPA of every 50th student on the list; c) A financial advisor needs an updated value of the Dow Jones Industrial Index. She selects 30 successful publicly owned companies on her own and estimates the index from there.

Use the given grouped data distribution to answer the questions below. EXCEPT FOR PERCENTAGES, USE MINIMUM THREE DECIMAL PLACES IN ALL APPLICABLE COMPUTATIONS. PLEASE DO NOT IGNORE THE INSTRUCTIONS

<table>
<thead>
<tr>
<th>Classes</th>
<th>F</th>
<th>Boundaries</th>
<th>m</th>
<th>CF</th>
<th>RF</th>
<th>CRF</th>
<th>PF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 7</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 to 14</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 to 21</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>22 to 28</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a) Complete the chart; b) From the classes, give the value of the class width (DO NOT COMPUTE IT)

Convert the given pie graph to a vertical Pareto graph. Sloppy work earns zero credit

Use the sample of scores: {16, 26, 20, 15, 24, 31, 27, 21, 18, 10, 26, 23, 28, 22, 25, 12, 26, 13, 29, 10, 11}

a) Compute the class width and form six classes
b) Construct the frequency distribution
c) Construct the class boundaries (or intervals)
d) Construct the class marks.

Construct the dot plot for the set of data:
2, 5, 3, 4, 5, 5, 4, 4, 4, 0, 5, 3, 6, 1.

b) Name the approximate shape of the distribution.

The given bar graph shows the end-of-quarter water charges (in U.S. Dollars) from Miami-Dade Water and Sewer Department to a particular household during the period from October-2009 to December-2010. Use it to answer the following:

a) Which quarter showed the least charge?

b) How much higher was the charge on the quarter ending on Sep-10 than the quarter ending on Mar-10?

c) What percent of the total charges is the charge on the quarter ending on Jun-10? Round to the nearest 10th of a percent.
[14] Use the given grouped data distribution.

<table>
<thead>
<tr>
<th>Classes</th>
<th>f</th>
<th>Boundaries</th>
<th>m</th>
<th>CRF</th>
<th>PF</th>
<th>CPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 12</td>
<td>3</td>
<td>4.5 to 12.5</td>
<td>8.5</td>
<td>0.1250</td>
<td>12.50%</td>
<td>12.50%</td>
</tr>
<tr>
<td>13 to 20</td>
<td>4</td>
<td>12.5 to 20.5</td>
<td>16.5</td>
<td>0.2917</td>
<td>16.67%</td>
<td>29.17%</td>
</tr>
<tr>
<td>21 to 28</td>
<td>8</td>
<td>20.5 to 28.5</td>
<td>24.5</td>
<td>0.6250</td>
<td>33.33%</td>
<td>62.50%</td>
</tr>
<tr>
<td>29 to 36</td>
<td>5</td>
<td>28.5 to 36.5</td>
<td>32.5</td>
<td>0.8333</td>
<td>20.83%</td>
<td>83.33%</td>
</tr>
<tr>
<td>37 to 44</td>
<td>4</td>
<td>36.5 to 44.5</td>
<td>40.5</td>
<td>1.0000</td>
<td>16.67%</td>
<td>100.00%</td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100.00%</td>
</tr>
</tbody>
</table>

a) Construct the vertical CRF histogram  
b) Construct the frequency polygon  
c) Construct the horizontal RF bar graph  
d) Construct the CPF ogive

[15] Use the given stem-and-leaf display to answer the questions at right.

| STEM | LEAF  | a) Give the value of the stem and the leaf (separately) for the first observation in the fourth row  
b) How many scores are there in the data set?  
c) Compute the midrange  
d) Compute the range  
e) Name the (approximate) shape of the distribution  
f) Estimate the value of the standard deviation  
g) Is the distribution bimodal? Explain  
h) Find the median

[16] For the set of scores: \{3.0, -5.0, 10.3, -7.0, 10, 8.2\}, compute: (Show all work and relevant symbols. Answers without the correct backup work and/or without the correct symbols may earn zero credit). When applicable, round final answers to the nearest 1000th; a) the mean; b) median; c) midrange; d) compute the variance using the formula \( s^2 = \frac{\sum(x - \bar{x})^2}{n-1} \); show input of all values; e) compute the variance using the formula \( s^2 = \frac{\sum x^2 - (\sum x)^2}{n(n-1)} \); show all input values; f) compute the coefficient of variation and interpret (without correct interpretation your answer earns zero)

[17] A distribution of numerical scores has mean 80 and SD=5; a) If the distribution is bell-shaped, estimate the percent of scores that are: a1) at most 75; a2) at least 70; a3) between 75 and 90; a4) between 65 and 95; b) between what values can we expect to find approximately 95% of all scores in the data set? c) Is the score 91 a usual value, a suspicious outlier, or a definite outlier? d) List the intervals where we may find suspicious outliers; e) List the intervals where we may find definite outliers; f) Is the score 64 a usual value, a suspicious outlier, or a definite outlier?

[18] Use the data of exercise 17 (mean 80, SD = 5). If the shape of the distribution is unknown, estimate the percent of scores: a) between 75 and 85; b) between 70 and 90; c) between 65 and 95.

[19] A distribution of scores has mean 100 and standard deviation 16. Compute the variance.

[20] At a particular state university, the mean cumulative GPA of all students is 2.95 with standard deviation 0.36. a) Compute and interpret the z-score of a student’s GPA of 3.36; b) Compute and interpret the z-score of a student’s GPA of 2.04; c) Find the GPA of a student whose z-score is 0.95; d) Find the GPA of a student with z-score −1.28; e) If the distribution of GPA’s is mound-shaped, find the interval that contains approximately 68% of the GPA values.
Chunying scored 1600 on the SAT, while her husband, Wo, scored 22.0 on the ACT. If the SAT scores have mean 1518 and standard deviation 325, while the ACT scores have mean 21.1 and standard deviation 4.8, who had better standing? Use the procedure shown in class.

One of the tallest women of the world is De-Fen Yao, who is 7.75 feet tall. If the heights of women have mean 5.34 feet and standard deviation 0.24 feet: a) De-Fen Yao’s height is how many standard deviations above the mean? b) If the heights of women have a bell-shaped distribution, find the interval that contains approximately 99.7% of the heights; b2) find the interval that contains usual height values; b3) find the interval that contains unusual height values; b4) find the interval that contains suspicious outlier values of the heights; b5) classify the heights of women: {5.11 ft, 4.50 ft, 5.83 ft, 6.07 ft, 4.89 ft, 8 ft, 5.50 ft, 4.74 ft, 5.60 ft} as usual values, suspicious outliers, or unusual values.

The International Office of Weights and Measurements reports that 21% of all women are 5.69 feet tall or taller. Give the percentile rank of 5.69 feet; b) If the height 5.82 feet is the 95th percentile, interpret what this means; c) write the five equivalent statements that describe P{5.82}=5.58.

Use the given box-whisker plot to find: a) 5-number summary; b) P(75) Interpret; c) the midhinge; d) the midrange; e) the range; f) IQR; g) the inner fences; h) the outer fences; i) the interval that contains the usual data values; j) the interval that contains the unusual data values; k) Which of the following are suspicious outliers? Definite outliers? Usual values? 17, 18, 53, 54, 66, 68, 69?

The data set shows recorded red blood cell counts (in M/µL) from a random sample of 21 dogs: {8.3, 6.3, 5.5, 8.4, 6.3, 6.7, 6.4, 6.9, 6.7, 6.0, 5.4, 6.7, 7.1, 0.3, 5.0, 7.0, 10.9, 6.3, 7.0, 6.6, 1.2, 7.5}; a) Verify that ∑x = 138.5; ∑x^2 = 970.73; and compute the mean and the standard deviation; b) Based on the Empirical Rule, if the distribution is mound-shaped, what percent of the red blood cell counts lie between 4.13 M/µL and 8.36 M/µL; c) Based on the Empirical Rule, if the distribution is mound-shaped, what interval contains approximately 99.7% of the red blood cell counts; d) Based on the z-scores, find the interval that contains what we expect to be usual values of red blood cell counts; e) Find the outliers (if any) using the z-score criteria; f) Find the inner fences and the interval that contains what we expect to be usual values of red blood cell counts (based on quartiles); g) Find the outer fences and any outliers (based on quartiles); h) Find the interval that contains what we may consider usual values of red blood cell counts (based on quartiles); i) Find the intervals that contain what could be suspicious outliers (based on quartiles); j) Find the intervals that contain what could be definite outliers (based on quartiles);

An experiment consists of selecting one number from the set {7, 3, 2} and then selecting one letter from the word GIVE. Construct the complete sample space for this experiment.

In a Traffic Safety poll a group of drivers were asked if it should be illegal to text message while driving. Three hundred eighteen drivers responded “yes, it should be illegal.” Twenty one drivers responded “no, it should not be illegal.” Find the probability of randomly selecting a driver who believes it should be illegal to text message while driving. Round to at least the nearest 100th.

Sample space for tossing a fair coin three times: {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT} a) Find the probability of getting at most two tails. Interpret; b) Which of the following is a simple event? Explain: E={more than three tails}; F={getting exactly one tail}; G={getting no tails}
[29] In each part, determine whether the given pair of are mutually exclusive: 
a) \( E \): getting less than three when tossing a fair six-sided die once; 
b) \( F \): getting more than three when tossing a fair six-sided die once; 
c) \( G \): getting at least three when tossing a fair six-sided die once; 
d) \( H \): getting at most three when tossing a fair six-sided die once; 
e) \( I \): being a professional basketball player; 
f) \( J \): being a mathematician; 
g) \( K \): being a Democrat registered voter; 
h) \( L \): being a Republican registered voter;

[30] Compute: 
a) \( \binom{9}{1} \); 
b) \( \binom{8}{0} \); 
c) \( \binom{16}{10} \); 
d) \( \binom{11}{10} \); 
e) \( 24 \binom{9}{6} \); 
f) \( 13 \binom{9}{6} \); 
g) \( 6 \binom{9}{6} \); 
h) \( 16 \binom{9}{6} \);

[31] How many four-person committees can be formed from a group consisting of five mathematics professors, six English professors, and three physics professors?

[32] Suppose that \( S = \{e_1, e_2, e_3, e_4, e_5, e_6, e_7, e_8, e_9\} \) is the sample space of an experiment. 
\( E = \{e_1, e_2, e_3\} \), 
\( F = \{e_1, e_2, e_3, e_6, e_8\} \), 
\( G = \{e_8, e_9\} \) are events from \( S \) and the probabilities of the sample points of \( S \) are:
\( P(e_1) = 0.08; \) \( P(e_2) = 0.11; \) \( P(e_3) = 0.07; \) \( P(e_4) = 0.14; \) \( P(e_5) = 0.10; \) \( P(e_6) = 0.06; \) \( P(e_7) = 0.21; \) \( P(e_8) = 0.03; \) \( P(e_9) = 0.20 \)

a) Construct the correct Venn diagram; 
b) Compute: 
a1) \( P(E \cap F) \); 
b1) \( P(E \cup F) \); 
b2) \( P(E \cap F^c) \); 
b3) \( P(E \cap F) \); 
b4) \( P(E \cap F^c) \); 
b5) \( P(E \cap F) \); 
b6) \( P(E \cap F) \); 
b7) \( P(E \cap G) \); 
b8) \( P(E \cap G) \); 
b9) \( P(E \cap G) \); 
b10) \( P(E \cap G) \); 
b11) \( P(F \cap G) \); 
b12) \( P(F \cap G) \); 
b13) \( P(F \cap G) \); 
b14) \( P(F \cap G) \);

[33] In a group of U.S. voters, the probability that a person opposes abortion is five times the probability that a person favors abortion and the probability that a person is indifferent (has no opinion) about abortion is half the probability that a person favors abortion. Find the probability that a randomly selected U.S. voter: 
a) favors abortion; 
b) opposes abortion; 
c) has no opinion about it.

[34]a) Consider the sample space: \( \{a, b, c, d\} \). If \( P(a) = \frac{3}{8}; \) \( P(b) = \frac{1}{8}; \) \( P(d) = \frac{3}{10} \), find \( P(c) \); 
b) Consider the sample space: \( \{a, b, c\} \). What is wrong with the probability assignments \( P(a) = \frac{2}{3}; \) \( P(c) = \frac{1}{2} \), if we want to find \( P(b) \)?

[35] A teacher knows that 66% of the students in her class passed algebra, 70% passed geometry, and 46% passed both courses. If a student is randomly selected from this class, find the probability that:
(\textit{round to the closest 1000th}): 
a) the student passed algebra or geometry; 
b) the student passed algebra only; 
c) the student passed neither algebra nor geometry; 
d) the student passed exactly one of the two courses; 
e) the student passed at most one of the two courses; 
f) the student passed at least one of the two courses; 
g) the student did not pass geometry; 
h) if the student passed geometry, then s/he passed algebra; 
i) the student passed geometry, given that s/he passed algebra; 
j) are the events “passing algebra”, “passing geometry” independent? Explain.

[36] The table shows the joint distribution of a group of men and women who are Democrats, Republicans, and Independents. Use the information to answer the questions.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Democrats (D)</th>
<th>Republicans (R)</th>
<th>Independents (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women (W)</td>
<td>60</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>Men (M)</td>
<td>45</td>
<td>40</td>
<td>15</td>
</tr>
</tbody>
</table>

If one person is selected at random from the group, find the probability that \( s/he \): 
a) is a woman; 
b) is not a Republican; 
c) is a Democrat or a man; 
d) is an Independent and a woman; 
e) is neither a man nor a Republican; 
f) is a Republican woman; 
g) is an Independent and a Republican; 
h) is an Independent or a Republican; 
i) is a Democrat who is a woman; 
j) is a woman who is a Democrat; 
k) a selected man is an Independent; 
l) a selected Independent is a man; 
m) is a Democrat given that s/he is a woman; 
n) is a woman, if s/he is a Democrat; 
o) given that the person is a woman, is an Independent; 
p) given that the person is an Independent, is a woman; 
q) \( P(W \cup I) \); 
r) \( P(M \cap R) \); 
s) \( P(D \cup M^c) \); 
t) \( P(R^c \cap W) \); 
u) \( P(I | M) \); 
v) \( P(W | R) \); 
w) Are the events “Woman” (W), “Democrat” (D), statistically independent? Explain.
ANSWERS TO SELECTED QUESTIONS
1[a] descriptive statistics; b) inferential statistics. 2[a] parameter; b) statistic. 3[a] observational study; b) experiment. 4[a] the set of all students currently attending FIU; b) Amal is a female, Arab student, GPA of 3.91, has completed 30 credits, she is a Sophomore, biology major; c) no, because she collected data from 4 FIU students and not from the whole population of all FIU students; d) Amal, Brian, Nancy, Maria; e) gender, ethnicity, GPA, number of credits completed, year-in-college classification, career path; f) Quantitative: GPA, number of credits; Continuous: GPA; Ordinal: college classification; Dichotomous: gender. 5] Qualitative: course grades, car manufacturers; Discrete: number of phone calls; Nominal: car manufacturers; Interval: temperature. 8[a] stratified sampling; b) systematic sampling; c) judgment sampling.

9[a] chart below; b) class width = 7

<table>
<thead>
<tr>
<th>Boundaries</th>
<th>m</th>
<th>CF</th>
<th>RF</th>
<th>CRF</th>
<th>PF</th>
</tr>
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<tbody>
<tr>
<td>0.5 to 7.5</td>
<td>4</td>
<td>2</td>
<td>0.125</td>
<td>0.125</td>
<td>12.50%</td>
</tr>
<tr>
<td>7.5 to 14.5</td>
<td>11</td>
<td>9</td>
<td>0.4375</td>
<td>0.5625</td>
<td>43.75%</td>
</tr>
<tr>
<td>14.5 to 21.5</td>
<td>18</td>
<td>13</td>
<td>0.2500</td>
<td>0.8125</td>
<td>25.00%</td>
</tr>
<tr>
<td>21.5 to 28.5</td>
<td>25</td>
<td>16</td>
<td>0.1875</td>
<td>1.0000</td>
<td>18.75%</td>
</tr>
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10]  

11]  

<table>
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<th>Classes</th>
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<th>m</th>
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<td>9.5 to 13.5</td>
<td>11.5</td>
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<td>25.5 to 29.5</td>
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<tr>
<td>30 to 33</td>
<td>1</td>
<td>29.5 to 33.5</td>
<td>31.5</td>
</tr>
</tbody>
</table>

12] a)  

b) Approximately, negatively skewed

13] a) the quarter ending on Mar-10  

b) $12.43 − $7.51 = $4.92  

c) ($10.34/$59.43)*100% = $17.4%
14\(c\) RF Horizontal Bar Graph

15\(a\) stem = 3; leaf = 4; \(b\) 35; \(c\) \((64 + 0)/2 = 32\); \(d\) 64 − 0 = 64; \(e\) positively skewed; \(f\) \(64/4 = 16;\) \(64/6 = 10.66\); no less than 10.667; no more than 16; \(g\) no; since there is only one mode (14), the distribution is unimodal;

\(h\) 22; \(16\(a\) \(\bar{x} = 3.25;\) \(b\) 5.6; \(c\) 1.65; \(d\) \(s^2 = \frac{\sum (x - \bar{x})^2}{n - 1} = \frac{292.955}{6 - 1} = 58.591\); \(e\) \(s^2 = \frac{\sum x^2}{n} - \frac{(\sum x)^2}{n} = \frac{356.33 - (19.5)^2}{6} = \frac{356.33 - 63.75}{5} = 58.591\); \(f\) \(CV = \left(\frac{s}{\bar{x}}\right) \cdot 100\% = \left(\frac{\sqrt{58.591}}{3.25}\right) \cdot 100\% = 235.5\%\). The CV indicates excessive variation, so there may be outlier data values. \(17\(a\)\) By the Empirical Rule: \(\text{a1}\) \(\approx16\%;\) \(\text{a2}\) \(\approx97.5\%;\) \(\text{a3}\) \(\approx81.5\%;\) \(\text{a4}\) \(\approx99.7\%;\) \(b\) between 70 and 90; \(c\) suspicious outlier; \(d\) \([65,70]\) or \([90,95]\); \(e\) \(x < 65\) or \(x > 95\); \(f\) definite outlier. \(18\) By Chebyshev’s Theorem: \(a\) cannot be determined by Chebyshev’s Theorem; \(b\) at least 75\%; \(c\) at least 88.9%. \(19\) \(s^2 = 256\).

\(20\(a\)\) 1.14; the GPA 3.36 is 1.14 standard deviations above the mean; \(b\) − 2.53; the GPA 2.04 is 2.53 standard deviations below the mean; \(c\) 3.29; \(d\) 2.489; \(e\) \([2.59,3.31]\); \(21\) Chunying’s \(z = 0.25;\) Wo’s \(z = 0.19;\) Chunying had better standing. \(22\(a\)\) 10.04; \(b\) \(b1\) \([4.62, 6.06]\); \(b2\) \([4.86, 5.82]\); \(b3\) \(x < 4.86\) or \(x > 5.82;\) \(b4\) \([4.62, 4.86]\) or \([5.82, 6.06]\); \(b5\) usual values: 4.89 ft, 5.50 ft, 5.11 ft, 5.60 ft; suspicious outliers: 4.74 ft, 5.83 ft; unusual values: 4.50 ft, 4.74 ft, 5.83 ft, 5.67 ft; \(23\) \(a\) \(P_{75} = 5.69;\) \(P_{79} = 5.96;\) \(5.69\) is the 79\(^{th}\) percentile; \(b\) 5.82 is greater than or equal to 95\% of the data; \(c\) 5.58 is the 68\(^{th}\) percentile; 5.58 is greater than or equal to 68\% of the data; 5.58 is less than or equal to 32\% of the data; 68\% of the data is less than or equal to 5.58; 32\% of the data is greater than or equal to 5.58; \(24\) \(a\) minimum = 17; \(Q_1 = 31;\) \(Q_M = 34;\) \(Q_U = 40;\) minimum = 17; \(b\) \(P_{75} = 40;\) so, 40 is greater than or equal to 75\% of all the data; \(c\) 35.5; \(d\) 43; \(e\) 52; \(f\) 9; \(g\) \([17.5, 53.5]\); \(h\) \([4, 67]\); \(i\) \([17.5, 53.5]\); \(j\) \(x < 17.5\) or \(x > 53.5;\) \(k\) Suspicious outliers: 17.54, 66; Definite outliers: 68, 69; Usual values: 18, 53; \(25\) \(a\) \(\bar{x} = 6.30 \text{M/µL};\) \(s = 2.17 \text{M/µL};\) \(b\) approximately, 68\%; \(c\) \([-0.21, 12.80]\) \(\text{M/µL};\) \(d\) \([1.96, 10.63]\) \(\text{M/µL};\) \(e\) Only 0.3, 1.2, and 10.9 may be suspicious outliers. The rest of the data are in the interval that contains the usual values of red blood cell counts; \(f\) Notice that \(Q_L = 5.88;\) \(Q_M = 6.65;\) \(Q_U = 7.03;\) so, IQR = 1.15 and the inner fences form the interval \([4.16, 8.76]\) which contains what we expect to be usual values of red blood cell counts (based on quartiles); \(g\) The outer fences form the interval \([2.43, 10.48]\), so based on quartiles, 0.3, 1.2, and 10.9 could be definite outliers; \(h\) \([4.16, 8.76]\); \(i\) \([2.43, 10.46]\) or \([8.76, 10.48]\); \(j\) \(x < 2.43\) or \(x > 10.48;\) \(26\) \(\{7G, 7I, 7V, 7E, 3G, 3I, 3V, 3E, 2G, 2I, 2V, 2E\};\) \(27\) 0.9381; \(28\) \(a\) \(1/8\); if the experiment of tossing a fair coin (the same coin) three times is repeated a very large number of times, then as the number of repetitions increases, the relative frequency of getting at most two tails will approach \(1/8\); \(b\) \(G\) is the simple event because it consists of exactly one sample point: \(G = \{HHH\}.\) Event \(F\) is not simple because it consists of the interval \([2, 67]\);
more than one sample point: \( F = \{ \text{THH, HTH, HHT} \} \). Event \( E \) is not simple because it is an empty event; a) mutually exclusive; b) not mutually exclusive; c) not mutually exclusive; d) mutually exclusive; 30] a) 9; b) 1; c) 8008; d) 11; e) 1,307,504; f) 1; g) 15; 31] \( C_4 = 1001 \); 32] b1) 0.17; b2) 0.56; b3) 0.21; b4) 0.79; b5) 0.85; b6) 0.44; b7) 0.59; b8) 0; b9) 0.41; b10) 0.23; b11) 0.03; b12) 0.56; b13) 0.80; b14) 0.97; 33] a) \( \frac{2}{13} \); b) \( \frac{10}{13} \); c) \( \frac{1}{13} \); 34] a) \( \frac{1}{5} \); b) The sum \( P(a) + P(c) = \frac{7}{6} \) is already greater than 1. The total probability must be exactly 1, so \( P(b) \) would have to be \( -\frac{1}{6} \), but probability values cannot be negative. The probability assignments are totally invalid; 35] a) 0.90; b) 0.20; c) 0.10; d) 0.44; e) 0.54; f) 0.90; g) 0.30; h) \( P(A|G) = 0.6571 \); i) \( P(G|A) = 0.6970 \); j) Since \( P(A|G) = 0.6571 \) does not equal \( P(A) = 0.66 \), the events are not independent. You can also say that the events are not independent because \( P(A\cap G) = 0.46 \) does not equal the product \( P(A) \times P(G) = 0.462 \); 36] a) \( \frac{13}{23} \); b) \( \frac{14}{23} \); c) \( \frac{16}{23} \); d) \( \frac{8}{23} \); e) \( \frac{5}{23} \); f) \( \frac{0}{23} \); g) \( \frac{25}{46} \); h) \( \frac{4}{7} \); i) \( \frac{6}{13} \); j) \( \frac{3}{7} \); k) \( \frac{6}{13} \); l) \( \frac{12}{23} \); m) \( \frac{2}{13} \); n) \( \frac{4}{7} \); o) \( \frac{6}{13} \); p) \( \frac{29}{46} \); q) \( \frac{4}{23} \); r) \( \frac{35}{46} \); s) \( \frac{8}{23} \); t) \( \frac{3}{20} \); u) \( \frac{8}{9} \); v) \( \frac{5}{9} \); w) no, \( b|c \) \( P(W|D) = \frac{4}{7} \neq P(W) = \frac{13}{23} \). You may also answer that the events are not independent because \( P(W\cap D) = \frac{6}{23} \neq P(W) \times P(D) = \frac{27}{1058} \).