Instructions:
This exam contains 33 Multiple Choice questions. Each question is worth 3 points, for a total of 99 points. One point will be given for bringing your ID to the exam as well as filling in your name, UF ID#, and test code on your scantron correctly.

Please select the best answer among the alternatives given.

You may write whatever you want on this test, but only the answers bubbled in the scantron sheet will be graded. You must submit the scantron sheet for you to receive a grade on the exam. You must show the copy of the exam to the test room proctors before turning in your scantron.

\[
\hat{y} = a + bx \\
\quad b = \frac{s_y}{s_x} \\
\quad a = \bar{y} - b\bar{x} \\
\quad \bar{x} = \frac{\sum x_i}{n} \\
\quad \binom{n}{x} = \frac{n!}{x!(n-x)!}
\]

\[
P(x) = \binom{n}{x} p^x (1-p)^{n-x} \\
\mu = np \\
\sigma = \sqrt{np(1-p)} \\
\mu = \sum x P(x) \\
\frac{1}{\sqrt{n}}
\]

\[
P(A \text{ and } B) = P(A) P(B) \\
P(A | B) = \frac{P(A \text{ and } B)}{P(B)}
\]

Res = obs y - pred y

Honor pledge: "On my honor, I have neither given nor received unauthorized aid on this examination."

Signature: __________________

91. Which of the following measures of center is resistant to outliers?
   a.) Standard Deviation
   b.) Range
   c.) IQR
   d.) Median
   e.) Mean

92. On average, red kangaroos weigh 65 kg. Suppose that weights for red kangaroos are normally distributed with a standard deviation of 11 kg. What is the weight of a red kangaroo that is at the 3rd quartile?
   a.) 67.5
   b.) 68.4
   c.) 72.4
   d.) 78.5

\[
Z = 0.67 \\
\chi = Z \sigma + \mu \\
= 0.67(11) + 65 \\
= 72.37
\]
Questions 3 - 4: At a recent local teacher's conference, instructors were asked to state their years of teaching experience. The data from this question is posted in the stem and leaf plot below.

Stem-and-Leaf Display: Years_Exp

Stem-and-leaf of Years_Exp  N = 63
Leaf Unit = 1.0

- 11 0 1122233444
- 21 0 5555556666677777888889999999
- 31 1 000001222223344
- 16 1 05556999
- 8 2 0012
- 4 2
- 4 3 14
- 2 3 7
- 1 4 0

3. What is the median?
   a.) 32
   b.) 9
   c.) 8
   d.) 7
   e.) 7.5

\[ \text{Position of Median} = \left( \frac{n+1}{2} \right) = \left( \frac{63+1}{2} \right) = 32 \]

\[ 09 \times 1.0 = 9 \]

4. What is the IQR?
   a.) 8
   b.) 9
   c.) 10
   d.) 11
   e.) 12

\[ Q_1 \text{ is in the middle of the lowest } 31 \text{ numbers. So, it is in the 16th position. } Q_1 = 5 \]

\[ Q_3 \text{ is in the middle of the highest } 31 \text{ numbers. So, it is in the 46th position. } Q_3 = 15 \]

\[ IQR = Q_3 - Q_1 = 15 - 5 = 10 \]

5. Giraffe females are 14 feet tall, on average. Suppose that heights of giraffes are roughly bell shaped and symmetric. The tallest female giraffe on record was 22 feet tall. What would be a reasonable standard deviation of heights of giraffes?
   a.) 0 \( \Rightarrow \) All female giraffes would be the same height.
   b.) 0.5 \( \leq \) 14 - 3(0.5) = 13.5 \( \leq \) 14 + 3(0.5) = 15.5 \( \Rightarrow \) not enough variation
   c.) 2 \( \leq \) 14 - 3(2) = 8 \( \leq \) 14 + 3(2) = 20
   d.) 10 \( \leq \) 14 - 3(10) = -16 \( \leq \) can't have negative height
   e.) 100 \( \leq \) 14 - 3(100) = -286 \( \leq \) can't have negative height
**Question 6 – 7** The article “A migraine may change your brain” written by Saundra Young for CNN news talks about a meta-analysis study of migraines. Read the quote below and answer the following questions. This article was posted on August 28th, 2013.

"According to the study, the risk of white matter brain lesions increased about 68% for those suffering migraines with aura, compared to non-migraine sufferers. Those who suffered from migraines without aura saw that increased risk cut in half (34%), but they too could get lesions in the part of the brain that is comprised of nerve fibers."

6. What type of study would this be?
   a.) Blind Experiment
   b.) Double Blind Experiment
   (c.) Observation study
   d.) Census
   
   * Not ethical
   You can not randomly allocate migraines.

7. What would be the response variable?
   a.) Brain lesions
   b.) Migraines
   c.) Suffering with migraines with or without auras
   d.) None of the above.

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**Questions 8 – 9** On the “Beginning of the Semester Survey for Fall 2013” students were asked what type of transportation did they usually use to get to campus. These responses were then broken up by gender in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Bike</th>
<th>Bus</th>
<th>Car</th>
<th>Other</th>
<th>Scooter</th>
<th>Skateboard</th>
<th>Walk</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>19</td>
<td>76</td>
<td>19</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>81</td>
<td>206</td>
</tr>
<tr>
<td>Male</td>
<td>9</td>
<td>44</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>27</td>
<td>88</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>120</td>
<td>22</td>
<td>1</td>
<td>14</td>
<td>1</td>
<td>108</td>
<td>294</td>
</tr>
</tbody>
</table>

8. What is the conditional proportion of male students that used a scooter to get to campus?
   a.) 3 / 14
   b.) 3 / 294
   c.) 3 / 88
   d.) 14 / 294
   e.) 88 / 294

9. What is the probability that someone is a female given that they walked to campus?
   a.) 81 / 108
   b.) 81 / 206
   c.) 81 / 294
   d.) 108 / 206
   e.) 206 / 294
10. On the “Beginning of the Semester Survey for Fall 2013” students were asked how many parties they attended per week and how many minutes a day they spent exercising. Below are the summary statistics. Suppose that you wanted to predict the amount of time that someone spent exercising based on the number of parties that they attended.

**Descriptive Statistics: Exercise, Parties**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SE Mean</th>
<th>StDev</th>
<th>Minimum</th>
<th>Q1</th>
<th>Median</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise</td>
<td>299</td>
<td>53.44</td>
<td>2.49</td>
<td>43.04</td>
<td>0.00</td>
<td>30.00</td>
<td>45.00</td>
<td>60.00</td>
</tr>
<tr>
<td>Parties</td>
<td>298</td>
<td>1.0856</td>
<td>0.0719</td>
<td>1.2419</td>
<td>0.0000</td>
<td>0.0000</td>
<td>1.0000</td>
<td>2.0000</td>
</tr>
</tbody>
</table>

Pearson correlation of Exercise and Parties = 0.116

What is the least squares regression equation?

a. $\hat{y} = 49.07 + 4.02x$

b. $\hat{y} = 4.02 - 49.07x$

c. $\hat{y} = -213.74 + 4.02x$

d. $\hat{y} = 0.0033 + 0.9067x$

e. None of the above.

11. On the “Beginning of the Semester Survey for Fall 2013” students were asked how many miles they were away from their family. Below is the histogram of that data. What is the shape?

[Histogram showing a right-skewed distribution]

- a. Right skewed
- b. Left Skewed
- c. Bimodal
- d. Bell Shaped
- e. Uniform
12. On July 17th, 2013, twin panda cubs were born at the Atlanta zoo. The pandas will be named according to Chinese tradition on the 100th day from their birth. In the meantime, they are being called cub A and cub B. Below are the most recent weights of cub B in grams. What is the standard deviation of the weights?

394.7  888.0  1294.0  1385.0  1735.0  1887.0

a.) 248.72
b.) 373.06
c.) 503.75
d.) 551.83

\[ S_\chi = 551.8 \quad \text{get the sample standard deviation from your calculator} \]

Questions 13 – 14 In general, the percentage of people in the US who will get the flu each year is between 5% and 20%. Suppose that this year, the chance is 10% for those who have not had the flu shot. Suppose that 12 people are randomly selected from the US and that all of these people have not had the flu shot. Assume that these individuals can be considered independent of each other.

\[ n = 12 \quad p = .10 \]

13.) What is the expected number of people out of this sample that will be infected with flu?

a.) 0
b.) 1
c.) 1.2
\[ \text{mean} = np = 12(.10) = 1.2 \]
e.) Cannot be determined.

14.) What is the probability that 2 people out of the sample are infected with the flu?

a.) 0
b.) 0.08
c.) 0.230
d.) 0.889
e.) None of the above

\[ P(X=2) = \binom{12}{2} p^x (1-p)^{n-x} \]

\[ \binom{12}{2} = \frac{12!}{2!(12-2)!} = \frac{12!}{2!10!} = \frac{12 \times 11}{2 \times 10} = \frac{132}{20} = 6.6 \]

\[ P(X=2) = \binom{12}{2} \cdot 10^2 (1-.10)^{12-2} \]

\[ = 66 \cdot (.10)^2 (.90)^{10} = .230 \]
Questions 15 - 17  Below is a simple linear regression plot of the weights in grams of Cub A (panda bear born at the Atlanta zoo in July 2013) by age. Answer the following questions based on this plot.

15. Interpret the y-intercept, if appropriate.
   a.) The average birth weight is 249.5 grams.
   b.) The average birth weight is 45.56 grams.
   c.) The cub’s weight increases by 45.56 grams per day on average.
   d.) The cub’s weight increases by 249.5 grams per day on average.
   e.) Should not be interpreted.

16. If you were to use the regression equation to predict the weight of a cub when he was 5 years old, what type of error would be making, if any?
   a.) Extrapolation
   b.) Misuse of Cause and Effect
   c.) Volunteer Sampling Bias
   d.) Simpson’s Paradox
   e.) No error would be made.

17. Interpret the slope, if appropriate.
   a.) As the cub ages, his weight increases by 45.56 g per day.
   b.) As the cub ages, his weight tends to increases by 45.56 g per day.
   c.) As the weight goes up by 249.5 g, he ages one day.
   d.) As the weight goes up by 249.5 g on average, he ages one day.
   e.) None of the above.

I will accept a, b, and e as correct.
18. About 5% of students report that their primary mode of transportation is a scooter. Suppose that 3 students were randomly selected and asked if their primary mode of transportation was riding a scooter. If these three students' modes of transportation are independent of each other, what is the probability that all three say that riding a scooter is their primary mode of transportation?

\[ P(\text{all 3 students say "riding a scooter"}) = 0.05^3 = 0.000125 \]

b/c of independence

19. How would you represent the "99%" listed above using proper notation?

a.) \( P(Pr | T) \)

b.) \( P(T | Pr) \)

c.) \( P(T \text{ and } Pr) \)

d.) \( P(Pr) \)

e.) \( P(T^c | Pr^c) \)

20. What is the probability that a woman is pregnant and gets a positive test result?

\[ P(\text{+} | Pr) = 0.99 \]

\[ P(\text{+} \text{ and } Pr) = 0.05(0.99) \]

\[ = 0.0495 \]

21. What type of graph would you use to explore the relationship between birth weight of panda cubs and the gender for pandas born at the Chengdu panda research facility in the past five years?

a.) scatterplot - both quantitative variables

b.) boxplots - one categorical and one quantitative

c.) bar charts - categorical variable

d.) pie charts - categorical variable
22. In an article on ABCnews.com, Jane Allen writes about heart attacks warnings for women. The title of the article is “Profound Fatigue, Cold Sweats, Dizziness May Signal Heart Attack”. Answer the following question after reading this excerpt.

“In 2006, an American Heart Association survey conducted every three years found that 79 percent of women reported that the first thing they would do if they thought they were having a heart attack was to call 911. But in the 2009 survey, “we were shocked . . . that only 53 percent of women said they would call 911 first” said Suzanne Haynes, senior science adviser for the Office on Women’s Health and director of the campaign.”

Are the values “79%” and “53%” statistics or parameters?

a.) Both are parameters.
b.) Both are statistics.
c.) The 79% is a statistic, but the 53% is a parameter.
d.) The 79% is a parameter, but the 53% is a statistic.

23. A newspaper reporter looked at a breakdown of salaries by gender for Lake Wobogan University. They found that men made significantly higher salaries than women. A university administrator was quite concerned and decided to look into this issue; however, the university administrator broke the data down by college (education, medicine, law, liberal arts and sciences) as well as gender. He noticed that the apparent higher salaries for men disappeared after breaking the data down by college. What type of error occurred?

a.) Extrapolation
b.) Volunteer Response
c.) Simpson’s Paradox
 d.) Non Response Bias

24. A social scientist wants to study human relationship behavior. If she asks 600 randomly selected people if they have ever “asked someone out” through a social media website, what would be the margin of error?

\[ \text{margin of error} = \frac{1}{\sqrt{n}} = \frac{1}{\sqrt{600}} = .04 \]

a.) 0.04
b.) 0.05
c.) 0.0017
d.) 0.0025
e.) 0.00000277

25. Suppose that X has a continuous uniform distribution between 0 and 20. What is the probability that x is between 0 and 5?

a.) 0.20
b.) 0.238
c.) 0.25
d.) Cannot be determined
• 26. A September 13th, 2013, article written for Art Swift for Gallup (entitled “Americans Evenly Divided on Russia’s Plan for Syria”) says this “Results for this Gallup poll are based on telephone interviews conducted Sept. 11-12, 2013, on the Gallup daily tracking survey with a random sample of 1,038 adults, age 18 and older, living in all 50 U.S. states and the District of Columbia. Interviews are conducted with respondents on landline telephones and cellular phones . . .” What aspect of statistics is this describing?
   (a) Description ← summarizing the sample
   (b) Design ← how to obtain data
   (c) Inference ← extending conclusions from sample to population

• 27. What would be the best guess of the value of correlation coefficient, r, for this scatterplot?

![Scatterplot of y vs x](image)

- positive, fairly strong trend

  a.) -0.70
  b.) 0.70
  c.) 0.20 ← weak trend
  d.) -0.20

• 28. Maple trees grow differently depending on their surroundings, in sun or shade as well as regular or irregular sources of water. Suppose that one hundred trees were surveyed and their height was recorded. What would be the number of factors?

  (a) 2
  (b) 4
  (c) 25
  (d) 100

• 29. Which of the following is NOT a characteristic of the normal distribution?

  a.) centered around the mean.
  b.) symmetric
  c.) bell shaped
  d.) discrete
  e.) All of the above are characteristics of the normal distribution.

   The Normal distribution is centered around the mean, symmetric, bell shaped & continuous.
If you are checking to see if a probability distribution is valid, you check to see if all probabilities are between 0 and 1 and if all probabilities sum to 1. Not all values of x are possible.

30. Let X = the number of siblings that a randomly selected adult American has. According to recent General Social Surveys, its probability distribution is approximately \( P(0) = 0.048, P(1) = 0.167, P(2) = 0.188, P(3) = 0.178, P(4) = 0.124, P(5) = 0.082 \). Is this a valid probability distribution function? Use the following statements to discuss.

i.) All values of x must be greater than or equal to 0. \( x \geq 0 \) - not a condition

ii.) All probabilities must be between 0 and 1.

iii.) All probabilities must sum to 1.

- x | 0 1 2 3 4 5
- P(x) | 0.048, 0.167, 0.188, 0.124, 0.082

- All probabilities are between 0 and 1.
- \( 0.048 + 0.167 + 0.188 + 0.124 + 0.082 = 0.787 \)

31. Studies have shown that about 85% of drivers that are suspected of DUI take a breathalyzer, where as 34% take a blood test and 23% take both tests. Are these events independent or disjoint?

- a.) independent, but not disjoint
- b.) disjoint, but not independent
- c.) disjoint and independent
- d.) neither disjoint nor independent

\( P(A) = 0.85 \) Independent, \( P(A \cap B) = P(A)P(B) \)

\( P(B) = 0.34 \) Independent, \( P(A \cap B) = 0.289 \)

\( 0.23 \neq 0.289 \) Not Independent

\( 0.23 \neq 0 \) Not Disjoint

32. If John has a z-score of 0.7 on his first exam, what does this mean?

- a.) 70% of the class scored less than him.
- b.) 70% of the class scored higher than him.
- c.) He scored 0.7 standard deviations above the mean. \( z \) - score is the \# of standard deviations above or below the mean.
- d.) He scored 0.7 standard deviations below the mean.

33. A study found that people who used fountain pens on standardized exams were much more likely to score a "5" on the AP exam. If someone saw the results of this study and started taking all of their AP exams with fountain pens so that they would get all "5"s, what error have they been making?

- a.) extrapolation
- b.) misuse of cause and effect
- c.) undercoverage
- d.) nonresponse bias