1) Andrew is trying to determine if his new anti-headache drug, Naproxen, is better than what he currently uses, which is Aspirin. To determine this in a statistically valid way, he organizes an experiment where he will give his participants a dosage of one, two, three, or four pills of either Naproxen or Aspirin (but never both). Additionally, Andrew wishes to have a single control group which will receive no pills of any kind and containing the same number of subjects as each other treatment group. If he wants each treatment group to contain exactly 15 subjects, how many subjects does Andrew need to conduct his experiment?

A) 120 B) 135 C) 150 D) 165 E) NOTA

2) Behold the following dataset: 4, 7, 3, 5, 7, 3, 5, 2, 7, 98, 4, 3, 6, 8, 3, 12, 16, 22

What is the range of these data?

A) 96 B) 22 C) 4 D) 18 E) NOTA

3) Using the dataset from Question 2, determine the number of outliers present in the set.

A) 1 B) 2 C) 3 D) 4 E) NOTA

4) Kira has noticed an unusual trend at her hospital. At her hospital, she notices patients that have the rare diseases Purpleitis and Razz Apple Syndrome. Patients can have one of, both, or neither of these two terrible diseases. Kira knows the probability of a patient having both horrible diseases is 2%. Her colleague MuLu determines the probability of having Razz Apple Syndrome given a patient has Purpleitis is 20%. It is also a widely known fact that 81% of the population has neither disease. What is the probability of a random patient having Purpleitis, given they do not have Razz Apple Syndrome? Round to the nearest whole percent.

A) 6% B) 7% C) 8% D) 9% E) NOTA

5) Sticky Eric created a normal distribution, calculated some values with it, but then forgot what the mean and standard deviation were! He knows that the value 6 is at the 80th percentile, and the value 7 is at the 90th percentile. What is the sum of the mean and standard deviation of the original distribution? Round your answer to two decimal places, but do not round any intermediate steps.

A) 6.33 B) 6.34 C) 6.35 D) 6.36 E) NOTA

6) What is the population standard deviation of the first 20 Fibonacci numbers? Round to the nearest whole number.

A) 1768 B) 1753 C) 1752 D) 1708 E) NOTA

7) Consider a normal distribution with mean 1 and standard deviation 2. Using the empirical rule, what is the probability a randomly selected value lies within the interval $(-1, 5)$. Round to 3 decimal places.

A) 0.815 B) 0.819 C) 0.181 D) 0.185 E) NOTA

8) Behold the following dataset:

9, 8, 3, 9, 9, 7, 7, 0, 1, 10, 9, 10, 8, 9, 8, 11, 9, 8, 2, 9, 4, 6, 8, 10, 7, 5

Which of the following is the <u>best</u> description of the shape of the distribution of these data?

A) Left-Skewed
B) Symmetric
C) Right-Skewed
D) Uniform
E) NOTA

9) Fast Eddie is so fast that he has become unstoppable! His friend Slick Rick decides to do an opinion poll at their school to estimate the true percentage of people at the school who think Fast Eddie is unstoppable. To conduct his poll, Slick Rick simply asks everyone he sees in his classes one day at school. He then tallies the number of yes and no votes to get his percentage. What type of bias, if any, could influence Slick Rick's results?

A) Voluntary Response Bias
B) Undercoverage Bias
C) Non-Response Bias
D) Funding Bias
E) NOTA

10) Bailey is very smart when it comes to money, so he decides to make an investment using lottery tickets. He decides he is going to enter the lottery once per day for the next fourteen days. Assume each time he picks completely random numbers and each lottery entry is independent of all others. If the probability of him winning the lottery is 8% (Bailey is very lucky), what is the variance of the distribution of the number of times he may win the lottery in these two weeks? Round to two decimal places.

A) 1.02 B) 1.03 C) 11.99 D) 143.75 E) NOTA

11) John has collected some data and wants to display it in a graph to show his friends. More importantly, he wants the graph to be the most appropriate for the data so as to not mislead his friends. The data John has collected shows the count of the number of people at his school that live in each particular ZIP code. Of the following, which is the most appropriate type of graph to display this information?

A) Box and Whisker chart
B) Histogram
C) Bar chart
D) Scatterplot
E) NOTA

12) Alice has a favorite arithmetic sequence, the Alice Sequence, which is defined as $A_n = 7n + 6$ for $1 \leq n \leq 20$. Alice decides to challenge herself by manipulating the sequence and then calculating statistics from it. Help her out by calculating the mean of the sequence if each element is doubled.

A) 16.5 B) 79.5 C) 115.5 D) 231 E) NOTA

13) Alice's friend Amy decides to challenge her by asking what the mean of her arithmetic sequence is if 10 is added to each element. What is the new mean of the sequence if this occurs?

A) 16.5 B) 79.5 C) 115.5 D) 231 E) NOTA

14) William has 3 favorite activities he can do after school: jumping, bug catching, and sleeping. He also keeps records on which activity he does each day, but he spilt water on some of them! He knows there were a total of 180 days he had records for, and he also knows he did at least one activity each day. William spent 120 days sleeping, 132 days jumping, 110 days bug catching, and 58 days doing all three. He also spent 89 days sleeping and bug catching and 64 days jumping and bug catching. How many days did he do sleeping and jumping only?

A) 3 B) 14 C) 29 D) 86 E) NOTA

15) Alex decides to collect some data in his free time. He is trying to estimate the age of all students at Buchholz High School. So, he asks all of his friends in math class what their ages are. He gets the following results:

16, 16, 16, 16, 16, 16, 17, 17, 17, 17, 17, 18, 18, 18, 18

What is the sample standard deviation of these data? Round to 3 decimal places.

A) 0.806 B) 0.834 C) 0.854 D) 0.827 E) NOTA

16) Not to be outdone by Alex, Kira decides to collect her own data. She decides to ask <u>every</u> student at Buchholz their age personally. She gets 356 counts of age 14, 478 counts of age 15, 701 counts of age 16, 456 counts of age 17, and 301 counts of age 18. What is the population standard deviation of these data? Round to 3 decimal places.

A) 1.243 B) 1.244 C) 1.245 D) 1.246 E) NOTA

17) Kasra saw an ad on TV that claimed that 70% of people don't brush their teeth. Personally, he believes this number is much higher and decides to conduct research to determine if the TV percentage is plausible. Which of the following tests is the most appropriate to determine if Kasra's research provides statistically significant evidence to support his belief?

A) One-Sided, 1-Proportion Z-Test
B) Two-Sided, 2-Proportion Z-Test
C) Two-Sided, 1-Proportion Z-Test
D) One-Sided, 1-Proportion t-Test
E) NOTA

18) Jack needs to sample people in Florida for a secret project he is working on. He then thinks of a clever way to sample people in Florida. He decides to buy an ad slot on a statewide TV station and in the ad, he shows viewers two phone numbers, one to call to vote yes and one to call to vote no. Jack thinks this is perfect, but he needs to know the appropriate statistical name for his method of sampling so he can tell Andrew. What is the name of Jack's sampling method?

A) Stratified Radom Sample
B) Voluntary Response Sample
C) Cluster Random Sample
D) Simple Random Sample
E) NOTA

19) Jeffrey's most prized possession is his three-sided die. However, Olivia decides to play a prank on him by putting it in the microwave, which makes the die rigged. Jeffrey, however, anticipates this and uses his advanced math skills to perfectly calculate the new probability of rolling a 1, 2, or 3 to be 20%, 55%, and 25%, respectively. What is the sum of the new mean and standard deviation of rolling the three-sided die, according to Jeffrey's calculations? Round the final answer to 2 decimal places, but do not round any intermediate steps.

A) 2.72 B) 2.67 C) 2.82 D) 2.75 E) NOTA

20) What is the probability a random permutation of the letters in the word AMPHIBIOUS has all of the vowels next to each other? Round to 4 decimal places.

A) 0.0238 B) 0.1207 C) 0.5000 D) 0.6134 E) NOTA

21) John decides he wants to find out the true percentage of students at Gainesville High School (his population of interest) that like cargo shorts. To collect the data, he decides to steal the list of all registered students from the office and then manually contact each and every one, getting a response from all of them, which he finds more convenient than contracting others to do the work. What is the name for what John did?

A) Census
B) Systematic Sample
C) Full Sample
D) Convenience Sample
E) NOTA

22) Anna decides to play Wii Party with her friends, but she forgets how ridiculously rigged the dice are in the game! In order to pass a certain obstacle, she must roll a six on the die. She thinks this is easy, but she forgets that the actual probability of rolling a six in Wii Party is only 1.5%! What is the standard deviation of the number of times Anna expects to roll the die before she rolls a six, assuming each dice roll is independent? Round your answer to the nearest whole number.

A) 66 B) 67 C) 68 D) 69 E) NOTA

23) Eric decides to practice his free throws to impress his ladies. He decides to practice until he scores on two shots. Assume that each free throw is independent and that each shot he takes has a constant probability of 6% of scoring. What is the expected number of times Eric will attempt free throws in his practice before he scores two, rounded to the nearest whole number?

A) 33 B) 32 C) 17 D) 16 E) NOTA

24) Helena is conducting an experiment on lizards as part of her evil science degree. Specifically, she is trying to determine the effects of gamma radiation on the lizard's ability to solve calculus problems. However, the cheap radiation emitter she got from Evil Dollar General only has 4 settings: Off, Low, Medium, and Danger. In order to measure the lizard calculus ability as a quantitative variable, she determines how many problems they can solve in one minute. Helena hypothesizes that more radiation will lead to more problems being solved by the lizards. What is the best description of the independent variable (or explanatory variable) and the dependent variable (or response variable) for her experiment? NOTE: "IV" denotes the "independent variable" and "DV" denotes the "dependent variable."

A) IV: Number of Solved Problems, DV: Calculus Ability
B) IV: Number of Solved Problems, DV: Radiation Level
C) IV: Radiation Level, DV: Number of Solved Problems
D) IV: Calculus Ability, DV: Radiation Level
E) NOTA

25) Helena has to get her experiment approved by the Evil Ethics Committee before she can actually conduct it. However, she isn't very good under pressure and completely blanks out when the committee asks her what the experimental units of her experiment are. Help Helena out by identifying the experimental units from the experiment in Question #24.

A) Particles C) Radiation Emitters E) NOTA
B) Calculus Problems D) Lizards

26) Amy is at the airport, waiting for her flight, when she notices an unusual occurrence. She has been looking at the charts for two airlines, Big Air and Hot Air. When looking at the percentage of flights that get delayed between these two airlines over the years 2018 and 2019, she notices that if she compares each airline in each year separately, Big Air has the lower percentage each year, but if she finds the percentages for each airline over the two years and compares those, Hot Air has the lower percentage. What is the name for this unusual occurrence Amy noticed?

A) Bayes Theorem
B) Simpson's Paradox
C) Airline Paradox
D) Mean Value Theorem
E) NOTA

27) A fishy email Milaan received claims that 75% of the people in his area are interested in him. Being the skeptical person he is, Milaan decides to gather a sample in hopes to provide evidence to the contrary of the email's claim. He randomly samples 40 people in his area, and out of those 40, 28 were interested in him. Milaan is convinced that the true percentage of people interested in him is lower than the claimed 75% and conducts a one-proportion Z-test with his data. What is the P-value of his test? Round the final answer to 6 decimal places. Assume all conditions are met.

A) 0.116302 B) 0.232604 C) 0.767396 D) 0.465209 E) NOTA

28) Find a 95% confidence interval for the mean of a population given a sample of size 200, with a sample mean of 8, and if it is known that the population standard deviation is 16. Round any critical values to 3 decimal places and the final confidence interval limits to 6 decimal places, but do not make any other rounding in intermediate steps. You may assume all conditions are met.

A) (5.768937, 10.231063)
B) (5.782554, 10.217446)
C) (5.768986, 10.231014)
D) (5.782513, 10.217487)
E) NOTA

29) Which of the following is a correct interpretation of the interval you found in Question #28?

A) 95% of the time, the sample mean will lie in the interval.
B) There is a 95% chance the true mean lies in the interval.
C) We are 95% confident the true mean lies in the interval.
D) 95% of the time, the true mean will lie in the interval.
E) NOTA

30) Consider two independent normal distributions: distribution X with a mean of 5 and a standard deviation of 3, and distribution Y with a mean of 2 and a standard deviation of 4. If these two distributions are combined into a sum, what is sum of the mean and standard deviation of the new combined distribution of X + Y ?

A) 10 B) 13 C) 14 D) 12 E) NOTA