

For all questions, answer choice (E) NOTA means that none of the given answers is correct. Unless stated in the question, do not round the numbers in intermediate steps. Good Luck!

1. Vishal is trying to figure out how to master the 'Naruto run'. To do so, he has to determine the IQR of the following data set.

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 15, 13, 14, 15, 16, 17, 18, 19

Which of the following would allow Vishal to master the oh so renowned Naruto run?

- (A) 10 (B) 11 (C) 12 (D) 15 (E) NOTA

2. Anurag is currently deciding what college to commit to as he starts on his road to becoming a NFL Star. He decides that he will choose his team based on how friendly the students at the college are. Because he can't meet everyone, Anurag decides to meet with a representative sample of the student body at each and every college. To select this sample, Anurag divides the student body into groups based on age, and selects 10 students from each age group. What kind of sample is Anurag taking?

- (A) Systematic Sample (B) Cluster Sample (C) Stratified Sample (D) Simple Random Sample
(E) NOTA

3. Jeromy believes that Arsenal is the best team in the Premier League. To prove this, he decides to find the average amount of goals that Arsenal has scored each season over the past 10 years. The amount of goals scored is listed in the set below:

72, 74, 72, 68, 71, x , 77, 74, 73, 53

If the number that Jeromy concludes is 70.3, what is x ?

- (A) 68 (B) 72 (C) 71 (D) 67 (E) NOTA

4. Vamsi and Erin are arguing over who they think is the best artist from Blackpink. Vamsi thinks it's Jisoo, and Erin thinks it's Rose. To settle this argument, they decide to form a normal distribution of the heights of all KPOP artists. The results show that the mean height of the distribution is 66 inches with a standard deviation of 3 inches. Jisoo comes into the 66th percentile, and Rose comes into the 84th percentile. Which value is closest to the difference between their heights?

- (A) 1.20 (B) 2.45 (C) 1.25 (D) 1.23 (E) NOTA

5. Sina decides to conduct an experiment testing his swimming ability. He decides to fill his pool with three different liquids: syrup, mayonnaise (MAO), and tar. He first swims 200 laps in the syrup, then 200 laps in the MAO, and finally 200 laps in the tar. He times himself for every set of 200 laps. What is the independent variable of the experiment?

- (A) The time
(B) The liquid used
(C) The amount of laps swum
(D) The size of the pool
(E) NOTA

Use the following table to answer questions 6-9.

	My Hero Academia	Haikyuu	Black Clover
Freshman & Sophomores	60	38	46
Juniors & Seniors	42	41	52
Total	102	79	98

Tanusri surveyed a sample of Rickards students, asking them what their favorite anime is. The results are posted above.

6. $P(\text{Favorite Anime is Haikyuu})$
 (A) $\frac{38}{144}$ (B) $\frac{79}{279}$ (C) $\frac{38}{41}$ (D) $\frac{38}{79}$ (E) NOTA
7. $P(\text{Favorite Anime is My Hero Academia} \mid \text{Freshmen and Sophomores})$
 (A) $\frac{60}{41}$ (B) $\frac{60}{144}$ (C) $\frac{102}{41}$ (D) $\frac{102}{144}$ (E) NOTA
8. $P(\text{Favorite Anime is Black Clover} \cup \text{Juniors and Seniors})$
 (A) $\frac{79}{279}$ (B) $\frac{181}{279}$ (C) $\frac{38}{41}$ (D) $\frac{38}{79}$ (E) NOTA
9. $P(\text{Favorite Anime is My Hero Academia} \cap \text{Juniors and Seniors})$
 (A) $\frac{93}{279}$ (B) $\frac{42}{279}$ (C) $\frac{42}{102}$ (D) $\frac{93}{102}$ (E) NOTA
10. In order to pass through to the annual school carnival, Rohan has to answer the following question: What shape is a binomial distribution, with a low n value, when the p -value is far above 0.5? Which of the following should Rohan answer to get into the carnival?
 (A) Slightly Skewed Left (B) Extremely Skewed Left (C) Slightly Skewed Right
 (D) Extremely Skewed Right (E) NOTA

Use the following information for questions 11-13: Suppose that the average bench press weight of Rickards student is normally distributed with a mean of 400 pounds and a standard deviation of 80 pounds. A student is considered as strong if they can bench press between 450 and 540 pounds.

11. About what percentage of Rickards students are considered as strong?
 (A) 22.6 percent (B) 1 percent (C) 22.5 percent (D) 77.5 percent (E) NOTA
12. Suppose a representative sample of the population of 4 Rickards students was taken. What is the probability that all students in the sample can bench press between 450 and 540 pounds?
 (A) 2.5 percent (B) 3.2 percent (C) 1.4 percent (D) 36 percent (E) NOTA
13. What is the percent chance that a representative sample of 6 Rickards students have an average weight that is not considered as strong?
 (A) 6 percent (B) 8 percent (C) 92 percent (D) 94 percent (E) NOTA
14. Which of the following are conditions for conducting a significance test for the slope of a least squares regression line?
 I. Observations are independent of each other.

- II. The residual plot of the line is distributed Normally.
III. The standard deviation of the response y about the true line is the same everywhere.
IV. The true relationship is linear.
- (A) I & II (B) II, III & IV (C) I, III & IV (D) III & IV (E) NOTA
15. Sina has an unhealthy addiction to pranking people. Each of his pranks have the same success rate of 60% for making a fool out of the target, and assume that he is so good at what he does, that he is able to repeatedly prank someone with the same success rate. Assuming that he has not pranked anyone yet, and that nobody at Rickards High School is safe from him, what is the probability that Sina fails to prank 5 people before successfully pranking 10 people, rounded to the nearest thousandths digit?
(A) 0.076 (B) 0.238 (C) 0.186 (D) 0.124 (E) NOTA
16. In which of the following scenarios will the power of the statistical test decrease?
(A) The sample size of the test is increased.
(B) The α -level of the test is increased.
(C) The effect size of the test is decreased.
(D) A two-tailed test is turned into a one-tailed test.
(E) NOTA
17. When Rohan grows up, he wants to become a Bollywood movie star, a world-famous chef, and a saxophonist. There is a 25% chance that he can become a movie star, a 35% chance that he can become a famous chef, and a 45% chance that he can learn to play the saxophone, and he must achieve one of these goals before achieving another. If he becomes a movie star, the probability of him achieving another goal increases by 10%, if he becomes a chef, the probability of him achieving another goal decreases by 5%, and if he becomes a saxophonist, the probability of him achieving another goal decreases by 10%. Which of the following scenarios is most likely to occur?
(A) Rohan becomes a movie star, then a chef, but doesn't become a saxophonist.
(B) Rohan becomes a chef, then a movie star, then a saxophonist.
(C) Rohan becomes a saxophonist, then a movie star, but doesn't become a chef.
(D) Rohan becomes a movie star, then a saxophonist, then a chef.
(E) NOTA
18. Which of the following statements are true?
I. The chi-square distribution is skewed to the right.
II. The t-distribution has a lesser tendency for extreme values than the Normal distribution.
III. All binomial distributions are also Bernoulli distributions.
(A) I & II (B) I (C) III (D) I, II & III (E) NOTA
19. Vamsi is trying to collect stats to measure his basketball skills. He conducts trials where he attempts a three-point shot 30 times, with a 4% chance of success each time, and he notes down when he has his first success. Making the shot gets him really excited, to the point that he decides to immediately start the next trial after his first success. If he wants to produce a 97% confidence interval of the sample mean of his trials, what is the least number of trials he needs to conduct to have a margin of error that is less than or equal to 6?
(A) 67 (B) 35 (C) 79 (D) 111 (E) NOTA
20. What is the degrees of freedom for a chi-square test for goodness of fit, for a variable that has 6 levels?
(A) 20 (B) 6 (C) 30 (D) 4 (E) NOTA
21. Oh no! Erin has gone on another cancelling spree! At the moment, there are 58 people who are not cancelled yet, 108 people who are kinda cancelled, and 331 people who are cancelled. Erin was curious as to whether a person's affinity for squirrels was related to their cancel status. Here is the distribution of cancel status according to that variable:

	Not Cancelled	Kinda Cancelled	Cancelled
Likes Squirrels	24	57	154
Doesn't Like Squirrels	34	51	177

Find the p-value of the appropriate statistical test for determining this relationship and multiply that with the degrees of freedom for that test (round your answer to the nearest hundredth digit).

- (A) 0.67 (B) 0.51 (C) 0.72 (D) 0.45 (E) NOTA

22. Let v be a discrete random variable with the following probability distribution:

v	1	2	3	4	5
$P(v)$	0.11	0.22	0.12	0.14	0.31

What is the expected value of v , rounded to the nearest hundredth digit?

- (A) 2.97 (B) 3.02 (C) 3.12 (D) 3.33 (E) NOTA

23. If the size, y , of a bacterial colony doubles every hour, x , then the graph of which of the following transformations would result in a straight line?

- (A) $\log(y)$ vs. x (B) $\ln(y)$ vs. $\ln(x)$ (C) y vs. $\ln(x)$ (D) y vs. $\frac{1}{x}$ (E) NOTA

24. What does the covariance measure?

- (A) The effect of one random variable on the spread of another random variable.
 (B) The association between two random variables.
 (C) How much two random variables vary together.
 (D) The variability of the difference of two random variables.
 (E) NOTA

25. Tanusri can't stop rewatching the Office. However, instead of just rewatching each episode like a normal person, she sometimes gets carried away. She begins her rewatch on episode 1 of season 1, but after finishing any episode (it doesn't matter how many times she's already finished it), there is a 25% chance that she goes back and watches that episode again. Given that each episode is 20 minutes long, and that there are 201 episodes of the Office, what is the expected number of minutes that Tanusri's rewatch will take, rounded to the nearest hundredths place?

- (A) 5360.00 (B) 5270.25 (C) 5466.67 (D) 5025.00 (E) NOTA

26. Jeromy decided to conduct an experiment to see if listening to rap music causes a person to eat paneer, his favorite comfort food, faster than if they were listening to alt country music. He splits his subjects into two groups, one which listens to rap music, and one which listens to alt country. Envious of the other participants, Jeromy makes himself one of the test subject (bad design, I know), deciding that he would be tasked with eating 3x more paneer than the other subjects, while listening to classical music. How many treatments does Jeromy's highly flawed experiment have?

- (A) 3 (B) 2 (C) 5 (D) 4 (E) NOTA

27. Vishal and Vishnav are randomly drawing letters without replacement from their own names. Before drawing a name, there is a 50% chance that they get bored and decide to stop. What is the probability that they both stop drawing after 4 letters, and that the letters spell out "vish" in the order that they were drawn?

- (A) $3.72 * 10^{-4}$ (B) $1.86 * 10^{-6}$ (C) $7.75 * 10^{-8}$ (D) $3.23 * 10^{-9}$ (E) NOTA

28. If A is a random variable with a standard deviation of 5, and B is a random variable with a standard deviation of 6, what is the standard deviation of $A - B$ to the nearest hundredth digit, considering that the two variables are

- correlated with a correlation coefficient of 0.1?
(A) 3.32 (B) 8.19 (C) 7.42 (D) 7.81 (E) NOTA
29. In a certain binomial distribution, the probability of getting 4 successes in 6 trials is 0.225. What is the probability of success for each trial rounded to the nearest thousandths place, given that it is less than 0.5?
(A) 0.491 (B) 0.490 (C) 0.489 (D) 0.488 (E) NOTA
30. Shreyas wanted to know whether there is a difference in the average number of wraps that are rockin' from Tropical Smoothie Cafe and Subway. He takes 50 samples of 100 wraps from each location, and finds the sampling mean and standard deviation of Restaurant A to be 35 and 5, respectively, and the sampling mean and standard deviation of Restaurant B to be 40 and 8, respectively. Shreyas conducts the appropriate statistical test, but incorrectly finds the degrees of freedom to be 25. What p-value does Shreyas calculate, rounded to the nearest thousandths place?
(A) 0.170 (B) 0.161 (C) 0.160 (D) 0.165 (E) NOTA