

For all questions, answer choice (E) NOTA means that none of the given answers is correct. Good Luck!

- Ms. Fields had a very hard chemistry test with a mean of 57 and a standard deviation of 6. She decides to curve it resulting with a mean of 76 and a standard deviation of 12. If Sid got an 87 on the curved test, what did he get on the test previous to the curve?  
 (A) 69 (B) 72 (C) 34 (D) 56 (E) NOTA
- Ananya and Tanmay are trying to find their way around FSU's campus. They start at (0, 0) and are trying to go to (4, 6). If roads are defined by  $y = k$  or  $x = k$  where  $k$  is an integer, and they only go to the east or the north, what is the probability that they go to point (3, 5) at some point?  
 (A)  $\frac{2}{15}$  (B)  $\frac{8}{15}$  (C)  $\frac{1}{210}$  (D)  $\frac{4}{5}$  (E) NOTA
- The probability of Yash making a free throw is  $\frac{1}{10}$ . If he shoots 1000 free throws on Sunday at the Leach Fitness Center, what is the expected standard deviation of the amount of shots he makes?  
 (A)  $3\sqrt{10}$  (B) 10 (C) 90 (D) 100 (E) NOTA
- The variance of random variables  $M$  and  $N$  are 5 and 7. The variable  $P$  is the result of adding  $M$  and  $N$ . What is the variance of  $P$ ?  
 (A)  $\sqrt{74}$  (B) 12 (C) 74 (D)  $\sqrt{12}$  (E) NOTA
- Which of the following are true in regards to Bernoulli Trials:  
 I. Each observation is independent.  
 II. The number of trials has to be fixed.  
 III. Each observation represents one of two outcomes ("success" or "failure")  
 IV. The number of trials  $n$  has to be greater than 30.  
 V. The probability of "success"  $p$  is the same for each outcome.  
 (A) I, III, V (B) I, II, IV, V (C) I, V (D) I, II, V (E) NOTA
- Nitish wants to find the equation of the regression line that's calculated when finding the negative correlation between the number of homework assignments he completes versus the amount of time he spends watching anime a day. Find the equation of the regression line when  $\hat{y} = 23$ ,  $\hat{x} = 12$ ,  $S_y = 2.3$ ,  $S_x = 1.7$ ; and the coefficient of determination is 0.5329. Round the values to the nearest thousandth.  
 (A)  $y = 0.721x + 14.348$   
 (B)  $y = 0.988x + 11.148$   
 (C)  $y = -0.988x + 34.852$   
 (D)  $y = -0.721x + 31.652$   
 (E) NOTA
- On average, Saathvik watches 20 episodes of anime every day. Not to be outdone, Sharvaa thinks about animals on average 23 times a day. Let  $A$  be a variable that represents the number of anime episodes Saathvik watches on a given day, and let  $B$  be a variable that represents the number of times Sharvaa thinks about animals on a given day. Both  $A$  and  $B$  follow the Poisson distribution. Find  $P(A < B)$  to the nearest thousandth.  
 (A) 0.352 (B) 0.703 (C) 0.297 (D) 0.648 (E) NOTA

8. Oh no, Kramer just fell down a flight of stairs! This flight contains 10 steps. Each time he tumbles, he falls 1, 2, 5, or 8 steps down. Kramer hardly remembers the event, so Jerry wants to find out the number of different possible ways he could have fallen. Note that going down 1 step or 2 steps at a time is not considered falling. A 'fall sequence' must contain Help Jerry and tell him the number of different ways Kramer could have fallen down (remember 8, 8, 2, 2 is different from 2, 8, 2, 8).

(A) 6 (B) 133 (C) 132 (D) 44 (E) NOTA

After a spooky dream, Akhil predicts the world will end in 2064. Use the set of divisors of 2064, including itself for questions 9–10.

9. Let  $A$  be the population standard deviation of Akhil's set. Let  $B$  be the sample standard deviation of his set. Find the quotient if  $A$  is the dividend and  $B$  is the divisor to the nearest thousandth.

(A) 0.975 (B) 1.026 (C) 112.625 (D) 109.774 (E) NOTA

10. Navya wants to find the mean of Akhil's set. Give Navya the mean to the nearest tenth.

(A) 178.5 (B) 272.8 (C) (D) (E) NOTA

11. Which of the following statements about the Normal distribution are true?

- I. It is bimodal and symmetric
- II. The mode, median, and mean are all equal
- III. Has  $\mu = 0$  and  $\sigma = 1$
- IV. The Normal distribution is the limiting case of the binomial distribution
- V. The distribution of a sample of a normally distributed population is normal

(A) I, III, IV (B) II, III (C) II, III, V (D) II, IV, V (E) NOTA

12. Eric needs to simulate a roulette. He used a random number generator to create a sequence of 50 digits. The digits 00–38 represent a desirable number.

51646 42861 01651 64051 00641 31026 20413 42650 52655 41569

What is the average of the generated digits that represent desirable numbers?

(A) 15.8 (B) 19 (C) 14.8 (D) 19.2 (E) NOTA

13. What is the cube of the number of statements that are reasons why linear regression are not fully reliable?

- I. Heteroskedasticity
- II. Interpolation
- III. Extrapolation
- IV. Measures of variability
- V. Cronbach's alpha coefficient
- VI. Mundrathi's beta coefficient

(A) 1 (B) 8 (C) 27 (D) 64 (E) NOTA

14. The binomial distribution of getting an even number when rolling an unfair die has a mean of 157 and a standard deviation of 8 (all rounded to the nearest whole number). What is the number of trials in this distribution?

(A) 250 (B) 150 (C) 165 (D) 265 (E) NOTA

15. What is the shape of the binomial distribution in the previous question?

(A) symmetric (B) uniform (C) right-skewed (D) left-skewed (E) NOTA

16. After 15 hours of math with no breaks, Karthik begins to hallucinate. He begins to sample proportions of math questions that he has gotten right over the years, in comparison to his dad - a seasoned professional. He sees that his dad's proportion of problems correctly solved in 2021 and in 2022 is less than his proportion of correctly solved problems in each of those years. However, his total proportion is higher than his dad's total proportion. What describes this phenomenon?  
 (A) Amalgamation Paradox (B) Simpson's theory (C) Law of Reversal (D) Gambler's Fallacy (E) NOTA
17. Dylan is trying out for the bhangra team at Princeton called Bhangra Boyz. What is the probability that he doesn't make the team 3 times before making it if he has a 43% chance of making the team?  
 (A) 0.034 (B) 0.136 (C) 0.966 (D) 0.185 (E) NOTA
18. What is the sum of the mean and standard deviation of the distribution from the previous question?  
 (A) 2.147 (B) 4.081 (C) 2.710 (D) 10.018 (E) NOTA
19. Sukeerth, Haasini, Vaneesha, and Sagar are no longer freshmen! To celebrate this occasion, Sagar assigns each of the other three a random uniformly distributed number between 0 and 1. Let  $S$  be Sukeerth's number,  $H$  be Haasini's number, and  $V$  be Vaneesha's number. Help Sagar and find the probability that  $S + H + V$  is less than 1.  
 (A)  $\frac{1}{2}$  (B)  $\frac{1}{4}$  (C)  $\frac{1}{6}$  (D)  $\frac{1}{8}$  (E) NOTA
20. Sruthi has bad taste in food! Ananya believes that 87% of the food she likes is trash. To test this hypothesis, she takes a random sample of trashy food and finds that Sruthi likes 89 out of 94 of them. What is the sum of the average of the incorrect tailed tests plus the p-value of the correct tailed test rounded to the nearest thousandth?  
 ( $Sum = p - value_{correct} + \frac{p - value_{incorrect} + p - value_{incorrect}}{2}$ )  
 (A) 0.527 (B) 0.520 (C) 1.007 (D) 1.027 (E) NOTA
21. What is the  $(n + 3)$ th prime number if  $n$  is equal to the number of true statements regarding increasing the power of a significance test?  
 I. Decrease the significance level  
 II. Increase  $\alpha$ -value  
 III. Increase the sample size  
 IV. Conduct a one-tailed test  
 V. Decrease standard deviation  
 (A) 11 (B) 13 (C) 17 (D) 19 (E) NOTA
22. Events  $A$  and  $B$  are independent.  $P(A) = 0.3$  and  $P(B) = .7$ . Find  $P(A \cup B)$ .  
 (A) 1 (B) 0.79 (C) 0.3 (D) 0.21 (E) NOTA

Use the following table containing the number of students who want to take different classes at Tanner Hall for questions 23 – 24.

	Biology	Supernatural Beings	Zombies 101	Intro to Monster Hunting
Girls	26	58	37	69
Boys	35	12	42	21

23. The Dean believed that the students would take the classes in a 3:1:4:2 ratio, respectfully. What is the sum of the  $X^2$  statistic and degrees of freedom for this set of data rounded to the nearest thousandth?  
 (A) 57.249 (B) 138.707 (C) 49.236 (D) 36.822 (E) NOTA

24. Find the probability that a student is taking Intro to Monster Hunting given they are a girl?
- (A)  $\frac{34}{95}$                       (B)  $\frac{69}{190}$                       (C)  $\frac{37}{95}$                       (D)  $\frac{187}{256}$                       (E) NOTA
25. A random sample of 45 employees from the nationwide company Mosby Architecture is taken to create a 98% confidence interval of (122, 178) for the average number of reports completed in a month. What is a proper interpretation of this confidence interval?
- (A) Approximately 98% of the employees in the sample have completed between 122 reports and 178 reports.  
(B) Approximately 98% of the employees in the company have completed between 122 reports and 178 reports.  
(C) Approximately 98% of all random samples of size 45 from the company will produce confidence intervals that contain the mean number of reports completed by all employees from the company.  
(D) Approximately 98% of all random samples of size 45 from the population will produce intervals that contain the sample mean.  
(E) NOTA
26. Srividya noticed that a lot of students at Rickards High School do not submit work on time. She constructed a 96% confidence interval on the proportion of people who do not submit work on time. The school has 8182 students and 5952 of them do not submit work on time. She takes a sample of 1250 students and 936 of them ended up having a tendency to submit work late. What is the margin of error for this confidence interval rounded to the nearest thousandth?
- (A) 0.025                      (B) 0.157                      (C) 0.024                      (D) 0.156                      (E) NOTA
27. Nathan is conducting a left-tailed  $z$ -test on data he collected about the average amount of drink a customer filled their cup with at Papa's Cakepoperia. He believes that the average amount is less than 12 fluid ounces, but his boss keeps telling him that he is wrong. He took a sample of 50 people and found that there was a standard deviation of 15 within the data. What is the power of this test rounded to the nearest thousandth?
- (A) 75.491%                      (B) 68.237%                      (C) 71.768%                      (D) 65.843%                      (E) NOTA
28. A magical deck of 10 cards with 3 red cards and 7 black cards is used for a magic trick. The end result of the trick is to have all 3 red cards drawn randomly from the deck to shock the audience. Sadly, Wesley is very very bad at magic and can only draw 2 of the 3 red cards. What is the probability that this happens?
- (A) 0.175                      (B) 0.2                      (C) 0.058                      (D) 0.35                      (E) NOTA
29. What is the sum of the mean and standard deviation of the previous distribution?
- (A) 2.4                      (B) 3.6                      (C) 2.8                      (D) 1.6                      (E) NOTA
30. Shrung is conducting a survey to get a better look into his peers' schedules for the year. He stands with Mr. Juhasz (the math teacher) outside of his room after 4th period and asks people their favorite class as they leave and enter his room. Since only 14 answered the survey, he decides to send out an email to a bunch of students from the Rickards MAO email because he got locked out of his account. After gathering his data, he deduced that the majority of people like math class the most. Which of the following biases are not present in this situation?
- (A) Undercoverage Bias   (B) Voluntary Bias                      (C) Response Bias                      (D) Convenience                      (E) NOTA